Ref
TL
176
A1
I58

630-R

SPECIAL NOTICE INSIDE

Scientific and Technical Aerospace Reports

THE UNIVERSITY OF MICHIGAN
JAN 11 '73
REFERENCE

A SEMIMONTHLY ABSTRACT JOURNAL WITH INDEXES

DECEMBER 8, 1972

VOLUME 10 • NUMBER 23

N72-31988 — N72-32986

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

DEPOSITED BY THE
UNITED STATES OF AMERICA

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D. C. 20402, United States of America.

Semimonthly issues...

Annual subscription rate: $54, domestic; $68.25, foreign. Price per single copy: $2.25, domestic; 25% extra for foreign mailing.

Cumulative index issues...

Annual subscription rate: $17.00, domestic; $21.25, foreign. Price per single copy varies according to the number of pages.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, British Honduras, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order, or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:
UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION OFFICE
Scientific and Technical Aerospace Reports, Volume 10, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Tisco, Inc.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1975.

SPECIAL NOTICE

A new subscription service to NASA formal series printed reports at a substantial reduction from the equivalent cumulative single-title price is described on page vi of the Introduction to this issue of *Scientific and Technical Aerospace Reports*.

INTRODUCTION

A COMPREHENSIVE INFORMATION SERVICE

The National Aeronautics and Space Administration makes the results of worldwide research and development activities in aeronautics, space, and supporting disciplines promptly available to participants in its programs. NASA's scientific and technical information system now contains nearly a million documents, which are abstracted, indexed, and obtainable through retrieval and dissemination services. These services, which include this abstract journal, *Scientific and Technical Aerospace Reports (STAR)*, are described in a bulletin, *The NASA Scientific and Technical Information System . . . and How to Use It*, available at no charge from the NASA Scientific and Technical Information Facility, P.O. Box 33, College Park, Maryland 20740.

STAR—A REPORT ABSTRACTING SERVICE

STAR is a comprehensive abstracting and indexing journal covering current worldwide *report* literature on the science and technology of space and aeronautics. Publications abstracted in *STAR* include scientific and technical reports issued by NASA and its contractors, other U.S. Government agencies, corporations, universities, and research organizations throughout the world. Pertinent theses, translations, NASA-owned patents and patent applications, and other separate documents are also abstracted. Citations and abstracts in *STAR* are grouped in 34 subject categories, although accession numbers run in unbroken sequence through the *STAR* issues, without regard to category assignment.

Certain publications abstracted in *STAR* are given analytic treatment, with citations and abstracts of daughter items following immediately after the parent document. When the subject content of a daughter differs from that of its parent, a cross-reference citation is printed at the end of the category to which the daughter would normally have been assigned.

Five indexes are included in each issue: subject, personal author, corporate source, contract number, and report/accession number. Cumulative index volumes are published semiannually and annually.

STAR, issued on the 8th and 23rd of each month, is available to the public on subscription from the Superintendent of Documents, U.S. Government Printing Office, as noted on the inside cover. *STAR* is sent without charge to qualified organizations registered with NASA as described in the paragraph *Eligibility and Registration for NASA Information Products and Services*.

ABSTRACTS OF NONREPORT LITERATURE

By arrangement between NASA and the American Institute of Aeronautics and Astronautics, the AIAA publication *International Aerospace Abstracts (IAA)* provides parallel coverage of scientific and trade journals, books, and conference papers in the same subject areas as *STAR*. *STAR* and *IAA* are categorized and abstracted in basically identical ways, and documents in both are indexed by terms from the *NASA Thesaurus*. Both journals appear twice monthly, *IAA* being issued on the 1st and 15th of each month.

IAA is available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, NY 10017, at the following annual rates:

Semimonthly issues: United States and possessions, $110 postpaid; foreign countries, $125 postpaid.

Cumulated index volumes: United States and possessions, $75 postpaid; foreign countries, $90 postpaid.

ANNOUNCEMENT OF NASA PUBLICATIONS IN STAR

Scientific and technical reports produced by NASA and its contractors and grantees, or in conjunction with other Government agencies, and other selected documents released by NASA are identified by an asterisk (*) following the accession numbers (e.g., N72-10748*). Prior to their announcement in *STAR*, these NASA publications are assigned a specific NASA report number, which is shown on the last line of the *STAR* citation. The nature of NASA publications is specified by the report number series, identified by a prefix to the report number: TR-R, TN-D, TM-X, TT-F, CR, or SP. These series refer respectively to NASA Technical Reports, which contain significant and complete contributions to scientific and technical knowledge; Technical Notes, reports of similar quality but lesser scope; Technical Memorandums, reports containing preliminary data or of specialized utility; Technical Translations, information published in a foreign language and considered to merit NASA distribution in English; Contractor Reports, information generated under NASA-sponsored contracts, grants, or interagency agreements; and Special Publications, which include conference proceedings, monographs, data compilations, sourcebooks, special bibliographies, and other publications derived from or of value to NASA activities. Reports in these series that are printed by NASA are often referred to as "low-numbered" or "low series" publications, because the report number is always below 50,000 (8,000 for Technical Translations). Some TM-X and CR reports are numbered above 50,000. These, and TT-F translations above 8,000, are referred to as "high-numbered" or "high series" publications, and are generally available only in microfiche[1] or facsimile reproductions.

DISTRIBUTION OF NASA PUBLICATIONS

NASA distributes its publications to qualified recipients who have registered as described in the next paragraph. (Public availability of NASA reports and other publications announced in *STAR* is discussed separately in this Introduction.) Automatic distribution of low series NASA reports can be made in either paper (printed) copy or microfiche. High series NASA reports are given automatic distribution only as microfiche. The automatic distribution of a NASA report, in paper copy and/or microfiche, is made under the same subject category in which it is announced in *STAR*. A printed low series report usually is disseminated four to six weeks prior to its announcement in *STAR*. Microfiche of both low and high series reports are disseminated concurrently with *STAR* announcement. Automatic distribution of NASA documents is supplemented by a secondary request service, usually for microfiche copy only, which NASA may provide to qualified registrants.

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;
2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collec-

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 24:1 reduction).

tions of NASA documents for public reference;

4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services.

Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 33
College Park, MD 20740

Organizations abroad should direct requests to the same address, but to the attention of: Foreign Exchange and Acquisitions Branch.

PUBLIC AVAILABILITY OF DOCUMENTS ANNOUNCED IN STAR

The source of documents announced in *STAR* varies, depending upon the organization which has issued a document and the form in which the document can be provided. Those documents that can be obtained on microfiche are indicated in *STAR* by the # symbol following the NASA accession number. All documents for which microfiche can be obtained are also available as facsimile.

Documents that cannot be microfiched but for which one-to-one facsimile can be provided are indicated by a plus (+) instead of the # sign. Documents for which neither the + nor # symbol is shown, and for which no availability other than the issuing activity is given, may present unusual problems of reproducibility. The originator of such a document should be consulted as to its availability.

A source from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The NASA accession number is sufficient when ordering NASA and NASA-sponsored documents (indicated by an asterisk) from the National Technical Information Service. When ordering non-NASA documents (no asterisk) from the issuing agency or other sources, particularly NTIS, it is essential that additional bibliographic information, including the report number, be given.

The following are the most commonly indicated sources: (Full addresses of these organizations are listed at the end of this introduction.)

Avail: NTIS. Sold by the National Technical Information Service as indicated:

Currently Announced Documents. Facsimile (reproduced on demand) copies are sold for $3.00 plus 25 cents for every 5 pages over 20 pages, effective for all documents having the accession number N72-22991 (the first accession in 1972 *STAR* 14) or higher. The full price is shown in the citation.

Printed NASA Documents. Documents such as NASA Technical Reports, Technical Notes, Special Publications, Contractor Reports, Technical Memorandums (numbered below 50,000), and Technical Translations (below 8,000) are priced at $3.00 for documents of 300 pages or less; $6.00 for those in the 301-600 page range; $9.00 for those having 601-900 pages; and individually priced above 900 pages. Documents available from both the Superintendent of Documents (SOD), Government Printing Office, and from NTIS have the SOD price. All prices are shown in the citation. See page vi for NTIS printed document subscription rates.

Documents Announced Between July 1970 and July 1972. All documents with accession numbers between N70-27805 and N72-22990 are sold at the previously announced standard price, whether printed copy or facsimile is supplied. If "Avail: NTIS" appears in the citation, the document is sold at $3.00. Any other price is shown in the citation.

Documents Announced Prior to July 1970. A surcharge of $3.00 is applied to each document that, as of STAR Issue 14, 1972, is two years old from the time of its announcement, i.e., to all documents with an accession number lower than N70-27805 (the first accession number in Issue 14, 1970, of *STAR*), but not to more recently issued documents. Therefore, documents with older accession numbers of 300 pages or less are priced at a total of $6.00. Since no surcharge is applied to documents with over 300 pages, documents in the 301- to 600-page range are also sold for $6.00 in hard copy, and those in the 601- to 900-page range are sold at $9.00. Those exceeding 900 pages are priced by NTIS on an individual basis, except when priced by SOD. These prices do not change with time.

Microfiche. Microfiche is available from NTIS at a standard price of 95 cents (regardless of age) for those documents identified by the # sign following the accession number (e.g., N72-10411#) and having an NTIS availability shown in the citation. Standing orders for microfiche of (1) the full collection of NTIS-available documents announced in *STAR* with the # symbol, (2) NASA reports only (identified by an asterisk (*)), (3) NASA-accessioned non-NASA reports only (for those who wish to maintain an integrated microfiche file of aerospace documents by the "N" accession number), or (4) any of these classes within one or more *STAR* categories, also may be placed with NTIS at greatly reduced prices per title (e.g. 35 cents) over individual requests. Inquiries concerning NTIS Selective Categories in Microfiche should be addressed to the Subscription Unit, National Technical Information Service.

Deposit Accounts and Customers Outside U.S. NTIS encourages its customers to open deposit accounts to facilitate the purchase of its documents now that prices vary so greatly.

NTIS customers outside the United States are reminded that they should add the following handling and postage charges to the standard or announced prices: Hard (paper) copy, $2.50 each document; microfiche, $1.50 each document. For subscribers outside the United States who receive microfiche through the Selective Categories in Microfiche program, NTIS will add 15 cents for each title shipped.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The price and order number are given following the availability line. (An order received by NTIS for one of these documents will be filled at the SOD price if hard copy is requested. NTIS will also fill microfiche requests, at the standard 95 cent price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the Mississippi Test Facility, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: NASA Scientific and Technical Information Office. Documents with this availability are usually news releases or informational leaflets available without charge in paper copy.

Avail: AEC Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of U.S. Atomic Energy Commission reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the USAEC and its

depositories are described in a booklet, *Science Information Available from the Atomic Energy Commission* (TID-4550), which may be obtained without charge from the USAEC Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) at $10.00 each and microfilm at $4.00 each regardless of the length of the manuscript. Handling and shipping charges are additional. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the timely availability of specific documents and the possible utilization of local copying services (e.g., color reproduction).

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: National Lending Library, Boston Spa, England. Sold by this organization at the price shown. (If none is given, an inquiry should be addressed to NLL.)

Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

Other availabilities: If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line.

EUROPEAN AVAILABILITY OF NASA AND AGARD DOCUMENTS

Facsimile copy or microfiche of NASA and NASA-sponsored documents identified by both the symbols # and * and those AGARD reports that are on microfiche may be purchased from:

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. Charles de Gaulle
92-Neuilly-sur-Seine, France

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold by the National Technical Information Service at the established unit price of $3.00 for hard copy and 95 cents for microfiche. The NASA accession number should be used for ordering from NTIS. Printed copies of *patents* (which are not microfiched), are available for purchase at 50 cents per copy from:

Commissioner of Patents
U.S. Patent Office
Washington, DC 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents. Prepaid purchase coupons for ordering are also available from the Patent Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, DC 20546

COSATI SUBJECT CATEGORY CODE

In the citation of each NASA-supported document and of some non-NASA documents is a code (e.g., CSCL 25A) that indicates the subject category assigned to it from the COSATI Subject Category List (first ed. December, 1964) published by the Committee on Scientific and Technical Information of the Federal Council for Science and Technology.

INDEXING VOCABULARY

The Preliminary Edition of the *NASA Thesaurus* (December 1967) (NASA SP-7030) is used as the authority for the indexing vocabulary that appears in the subject index. The *NASA Thesaurus* should be consulted in examining the current indexing vocabulary, including associated cross-reference structure. Only the subject terms that have been selected to describe the documents abstracted in this issue appear in the subject index. Copies of the *NASA Thesaurus* may be obtained from the National Technical Information Service or the U.S. Government Printing Office at $8.50 for the three-volume set. The first two volumes of this Thesaurus, consisting of the alphabetical listing of subject terms (A–Z), have been superseded by the following single-volume publication: *NASA Thesaurus Alphabetical Update* (September 1971) (NASA SP-7040), available from NTIS for $6.00. (Volume III of the Preliminary Edition consists of the following ancillary aids to vocabulary selection: heirarchical display of index terms, category term listing, permuted index, and a listing of postable terms only.)

SUBSCRIPTION TO NASA PRINTED DOCUMENTS

The National Technical Information Service offers an annual subscription to printed NASA formal series reports at a per-title price, including handling and postage, of $2.00 domestic, $2.50 foreign. (There are no added charges beyond this for subscribers outside the United States.) About 1,000 titles are printed yearly; all must be subscribed to. Included are NASA Technical Reports, Technical Notes, Special Publications (including those printed by the Government Printing Office), Contractor Reports numbered below CR-50,000, Technical Memorandums numbered below TM-X-50,000, and Technical Translations numbered below TT-F-8000. Excluded are NASA patents, Technology Utilization publications (SP-5000 series), NASA continuing bibliographies (SP-7000 series), and Space Vehicle Design Criteria (SP-8000 series). (Continuing bibliographies can be purchased from NTIS on yearly subscription for specific titles and supplements or on an individual-title basis, while the TU and SVDC publications are sold by NTIS only on an individual-report basis.) For additional details on subscriptions, inquiries should be directed to NTIS.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

Engineering Sciences Data Unit Ltd.
251-259 Regent Street
London W1R 7AD, England

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. Charles de Gaulle
92-Neuilly-sur-Seine, France

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 33
College Park, Maryland 20740

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (KSI)
Washington, D.C. 20546

National Lending Library for Science
and Technology
Boston Spa, Yorkshire, England

National Technical Information Service
Springfield, Virginia 22151

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Atomic Energy Commission
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

U.S. Geological Survey
1033 General Services Administration Bldg
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Zentralstelle für Luftfahrtdoku-
mentation und -Information
8 München 86
Postfach 880
Federal Republic of Germany

Volume 10 Number 23 / December 8, 1972

TABLE OF CONTENTS

Subject Categories

Abstracts in the journal are grouped under the following categories:

page

01 Aerodynamics 3035
Includes aerodynamics of bodies, combinations, internal flow in ducts and turbomachinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 32 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

02 Aircraft 3038
Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc.; and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

03 Auxiliary Systems 3045
Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines; hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; 22 Nuclear Engineering; and 28 Propulsion Systems.

04 Biosciences 3046
Includes aerospace medicine, exobiology, radiation effects on biological systems; physiological and psychological factors. For related information see also: 05 Biotechnology.

05 Biotechnology 3053
Includes life support systems, human engineering; protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

06 Chemistry 3055
Includes chemical analysis and identification (e.g., spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

07 Communications 3058
Includes communications equipment and techniques; noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.

page

08 Computers 3062
Includes computer operation and programming; and data processing. For applications, see specific categories. For related information see also: 19 Mathematics.

09 Electronic Equipment 3065
Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors, integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

10 Electronics 3069
Includes circuit theory; and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories.

11 Facilities, Research and Support 3070
Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

12 Fluid Mechanics 3073
Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

13 Geophysics 3079
Includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

14 Instrumentation and Photography 3092
Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders, transducers; aerial photography; and telescopes and cameras.

15 Machine Elements and Processes 3097
Includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control; reliability; drafting; and materials fabrication, handling, and inspection.

16 Masers 3101
Includes applications of masers and lasers. For basic research see: 26 Physics, Solid-State.

17 Materials, Metallic 3104
Includes cermets; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see: 06 Chemistry. For related information see also: 18 Materials, Nonmetallic; and 32 Structural Mechanics.

page

18 Materials, Nonmetallic 3108
Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.

19 Mathematics 3110
Includes calculation methods and theory; and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

20 Meteorology 3111
Includes climatology; weather forecasting; and visibility studies. For related information see also: 13 Geophysics; and 30 Space Sciences.

21 Navigation 3116
Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

22 Nuclear Engineering 3117
Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

23 Physics, General 3118
Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics, 20 Meteorology, and 29 Space Radiation.

24 Physics, Atomic, Molecular, and Nuclear 3120
Includes atomic, molecular and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

25 Physics, Plasma 3122
Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

26 Physics, Solid-State 3126
Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

27 Propellants 3130
Includes fuels; igniters; and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

page

28 Propulsion Systems 3130
Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

29 Space Radiation 3134
Includes cosmic radiation; solar flares; solar radiation; and Van Allen radiation belts. For related information see also: 13 Geophysics, and 24 Physics, Atomic, Molecular, and Nuclear.

30 Space Sciences 3137
Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbits and trajectories. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

31 Space Vehicles 3142
Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also: 28 Propulsion Systems; and 32 Structural Mechanics.

32 Structural Mechanics 3145
Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

33 Thermodynamics and Combustion 3154
Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects; and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

34 General 3157
Includes information of a broad nature related to industrial applications and technology, and to basic research; defense aspects; information retrieval; management; law and related legal matters; and legislative hearings and documents.

page

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-49
CORPORATE SOURCE INDEX I-55
CONTRACT NUMBER INDEX I-67
REPORT/ACCESSION NUMBER INDEX I-71

TYPICAL CITATIONS AND ABSTRACTS

NASA CONTRACTOR REPORT CITATION AND ABSTRACT

NASA SPONSORED DOCUMENT

NASA ACCESSION NUMBER

TITLE

AUTHORS

CONTRACT OR GRANT

REPORT NUMBERS

AVAILABLE ON MICROFICHE

CORPORATE SOURCE

PUBLICATION DATE

AVAILABILITY SOURCE

COSATI CODE

N72-10043 # Boeing Co., Wichita, Kans.
STUDY AND DEVELOPMENT OF ACOUSTIC TREATMENT FOR JET ENGINE TAILPIPES
M. D. Nelson, L. L. Linscheid, B. A. Dinwiddie, III, and O. J. Hall, Jr. Washington NASA Nov. 1971 66 p refs (Contract NAS1-9622)
(NASA-CR-1853; D3-8535) Avail: NTIS CSCL 01B

A study and development program was accomplished to attenuate turbine noise generated in the JT3D turbofan engine. Analytical studies were used to design an acoustic liner for the tailpipe. Engine ground tests defined the tailpipe environmental factors and laboratory tests were used to support the analytical studies. Furnace-brazed, stainless steel, perforated sheet acoustic liners were designed, fabricated, installed, and ground tested in the tailpipe of a JT3D engine. Test results showed the turbine tonas were suppressed below the level of the jet exhaust for most far field polar angles. Author

PATENT CITATION

NASA CASE NO.

U.S. PATENT CLASS NUMBERS

U.S. PATENT NO.

N72-12440* Auburn Research Foundation, Inc., Ala.
LASER COOLANT AND ULTRAVIOLET FILTER Patent
John R. Rasquin and Fred R. McDevitt, inventors (to NASA)
Issued 13 Jul. 1971 14 p Filed 2 Oct. 1969 Supersedes N70-22250 (08-09, p 1645
(NASA-Case-MFS-20180; US-Patent-3,593,194; US-Patent-Appl-SN-863276; US-Patent-Class-331-94.5; US-Patent-Class-350-1; US-Patent-Class-350-312) Avail: US Patent Office CSCL 20E

PATENT APPLICATION CITATION

U.S. PATENT APPLICATION SERIAL NO.

N72-10432*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DIATOMIC INFRARED GASDYNAMIC LASER Patent Application
Robert L. McKenzie, inventor (to NASA) Filed 26 Apr. 1971 14 p
(NASA-Case-ARC-10370-1; US-Patent-Appl-SN-137391) Avail: NTIS CSCL 20E

PRIMARY ANALYTIC CITATION AND ABSTRACT

PLACE OF PUBLICATION

EXCEPTION PRICING

SUBSIDIARY ANALYTIC ACCESSIONS

N72-10856*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
THE GEMINI PROGRAM: PHYSICAL SCIENCES EXPERIMENTS SUMMARY
Edward O. Zeitler, comp. and Thomas G. Rogers, comp. (ITT Federal Electric Corp. Houston, Tex.) Sep. 1971 554 p refs
(NASA-TM-X-58075) Avail: NTIS HC $6.00/MF $0.95 CSCL 22C

Results and findings of physical sciences experiments performed in the Gemini program are presented. The summary contains descriptions of selected studies in the fields of astronomy, navigation, radiation, geophysics, meteorology, photography, and communications. For individual titles, see N72-10857 through N72-10891.

SUBSIDIARY ANALYTIC CITATION

PRIMARY ANALYTIC ACCESSION AND LOCATION OF FULL CITATION AND ABSTRACT

PAGES IN PRIMARY REPORT

PRICE OF PRIMARY REPORT

N72-10862*# Geological Survey, Flagstaff, Ariz.
EXPERIMENT S029: EARTH-MOON LIBRATION REGIONS PHOTOGRAPHY
Elliott C. Morris *In* NASA. Manned Spacecraft Center The Gemini Program: Phys. Sci. Expt. Sum. Sep. 1971 p 71-75 (See N72-10856 01-30)
Avail: NTIS HC $6.00/MF $0.95 CSCL 14E

VOLUME 10 NUMBER 23 / DECEMBER 8, 1972

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERODYNAMICS

Includes aerodynamics of bodies, combinations, internal flow in ducts and turbo machinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 31 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

N72-31988 Engineering Sciences Data Unit, London (England).
AERO-NORMALISED STABILITY DERIVATIVES: EFFECT OF WING ON YAWING MOMENT DUE TO YAWING
Sep. 1971 14 p refs Supersedes ESDU-Aero-A.07.01.02 Sponsored by Roy. Aeron. Soc.
(ESDU-71017; ESDU-Aero-A.07.01.02) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Aero-normalized yawing moment derivatives are presented for plain wings, wings with flaps, and separated flow. F.O.S.

N72-31989 Engineering Sciences Data Unit, London (England).
A METHOD FOR ESTIMATING THE PRESSURE DISTRIBUTION ON THE SURFACE OF A TWO-DIMENSIONAL AEROFOIL IN A SONIC STREAM
Jul. 1969 72 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-69013) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

A method is presented for calculating the pressure distribution on an airfoil in a sonic stream. The method is based on theoretical and empirical relationships and comprises a number of separate procedures which are set out. To apply these procedures it is necessary to specify only the airfoil geometry and the angle of incidence for which the calculation is to be made. Each calculation is made essentially in four main stages. The first stage determines the stagnation point, the second and third stages evaluate the subsonic flow over appropriate portions of the airfoil and the fourth stage evaluates the region of supersonic flow. The method may be applied to a wide range of both round- and sharp-nosed, lifting and nonlifting sections including that category of airfoils exhibiting a velocity peak in the vicinity of the leading edge. Author

N72-31990 Engineering Sciences Data Unit, London (England).
LIFT-CURVE SLOPE AND AERODYNAMIC CENTRE POSITION OF WINGS IN INVISCID SUPERSONIC FLOW
Sep. 1970 18 p refs Revised Sponsored by Roy. Aeron. Soc.
(ESDU-70012) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Wings with straight leading and trailing edges and streamwise tips are considered in a study of the aerodynamic center of wings with subsonic trailing edges. The theory from which the data were derived is that of linearized supersonic flow, which limits its application to wings of small thickness, camber, and twist at low incidence. It is, in addition, a theory for inviscid flow in which separation is assumed to occur only from the trailing edge. A basis is provided on which to build modifications due to thickness, boundary layer effects, etc., to obtain the lift-curve slope and aerodynamic center position for any wing with straight leading and trailing edges in a real flow. Author

N72-31991 Engineering Sciences Data Unit, London (England).
LIFT-CURVE SLOPE AND AERODYNAMIC CENTRE POSITION OF WINGS IN INVISCID SUBSONIC FLOW
Jul. 1970 18 p refs Supersedes Aero-W.01.01.01 and in part Aero-W.S.01.03.03-06 and Aero-W.S. 08.01.02 Sponsored by Roy. Aeron. Soc.
(ESDU-70011; Aero-W.01.01.01; Aero-W.S.01.03.03.06; Aero-W.S.08.01.02) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Numerical representations of the lift-curve slope and aerodynamic center position of wings in inviscid, subsonic flow are presented. The data apply to wings with straight leading and trailing edges and streamwise tips. The theory is based on small perturbations and thus limits the application to wings of small thickness, camber, and twist at low incidence. The aerodynamic center is expressed as a fraction of the aerodynamic chord aft of the leading edge. Aerodynamic coefficients and mathematical models are included to support the theoretical aspects. Author

N72-31992 Engineering Sciences Data Unit, London (England).
AERO-NORMALISED STABILITY DERIVATIVES: EFFECTS OF FIN AND RUDDER ON ROLLING MOMENTS DUE TO SIDESLIP AND YAWING
Jun. 1970 8 p refs Supersedes ESDU-Aero-A.06.01.06 Sponsored by Roy. Aeron. Soc.
(ESDU-70006; ESDU-Aero-A.06.01.06) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Formulas for calculating the aero-normalized rolling moment derivative due to sideslip and yawing are presented. F.O.S.

N72-31993*# Aeronautical Research Associates of Princeton, Inc., N.J.
AN INVARIANT SECOND-ORDER CLOSURE MODEL OF THE COMPRESSIBLE TURBULENT BOUNDARY LAYER ON A FLAT PLATE Final Report
Coleman DuP. Donaldson and Roger D. Sullivan Jun. 1972 47 p refs
(Contract NASw-2224)
(NASA-CR-128172) Avail: NTIS HC $4.50 CSCL 20D

The development of an invariant model designed expressly for the computation of shear flows is discussed. The model for

incompressible layers seeks a second-order closure of the equations for the mean and fluctuating fields. The development of a method for computing the behavior of shear layers in compressible forces is described. The complexity of the analysis is restrained by limiting the consideration to a flat plate boundary layer where the mean pressure can be taken to be constant. Author

N72-31994# Advisory Group for Aerospace Research and Development, Paris (France). Fluid Dynamics Panel.
AERODYNAMIC PROBLEMS OF HYPERSONIC VEHICLES, VOLUME 1
R. C. Pankhurst, ed. Jul. 1972 237 p refs Lectures presented at Rhode-St.-Genese, Belgium, 18-23 Jan. 1970; sponsored in part by the von Karman Inst.
(AGARD-LS-42-Vol-1) Avail: NTIS HC $14.00

A lecture series covering aerodynamic problems of hypersonic vehicle design is presented. Specific lectures cover optimum wing shapes, propulsion systems, viscous flow interaction, reentry aerothermodynamics, nonequilibrium flow, and vehicle optimization.

N72-31995 Royal Aircraft Establishment, Bedford (England).
AERODYNAMICS AT MODERATE HYPERSONIC MACH NUMBERS
P. L. Roe *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 8 p refs (For availability see N72-31994 23-01)

Research on the theory of inviscid hypersonic flow and its application to hypersonic transport aircraft is presented. A definition is given for hypersonic in relation to its use by the author as well as rules for the use of the term inviscid flow. E.H.W.

N72-31996 Royal Aircraft Establishment, Bedford (England).
OPTIMUM SHAPES
P. L. Roe *In* AGARD Aerodyn. Prob. of Hypersonic Vehicles, Vol. 1 Jul. 1972 21 p refs (For availability see N72-31994 23-01)

The progress that was made in the application of optimization methods to hypersonic wing theory is reviewed. The wing design considered was the sharp-edged and nonslender. The efforts made to use optimization to define shapes for hypersonic transport vehicles were outlined. E.H.W.

N72-31997 Royal Aircraft Establishment, Bedford (England).
THEORY OF WAVERIDERS
P. L. Roe *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 17 p refs (For availability see N72-31994 23-01)

The use of waveriders to predict the hypersonic behavior of a given wing shape is discussed. Data cover accuracy of prediction method, standards for specific family shapes, levels of performance, and flow patterns about wing-like shapes. E.H.W.

N72-31998 Royal Aircraft Establishment, Bedford (England).
THIN SHOCK LAYER THEORY
P. L. Roe *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 26 p refs (For availability see N72-31994 23-01)

The application of thin shock layer theory to the aerodynamics of conical wing shapes is discussed. Particular attention is given to the flow structure behind the wing shape. E.H.W.

N72-31999 Royal Aircraft Establishment, Bedford (England).
MOMENTUM THEORY
P. L. Roe *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 12 p refs (For availability see N72-31994 23-01)

The use of the momentum theory to study aerodynamic lift and flow patterns on wing surfaces is examined. The data are used to help design wing shapes. E.H.W.

N72-32000 Royal Aircraft Establishment, Bedford (England).
FLOWS WITH HEAT ADDITION
P. L. Roe *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 11 p refs (For availability see N72-31994 23-01)

The influence of drag, heat additions, and flow patterns on hypersonic aircraft propulsion is studied. E.H.W.

N72-32001 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Flight Mechanics Div.
SPECIAL TOPICS IN HYPERSONIC FLOW
Richard D. Neumann *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 64 p refs (For availability see N72-31994 23-01)

Special topics covering flight performance, aerodynamic heating, and hypersonic flow of entry glide vehicles are outlined. Data cover surface distortions, leakage effects, aerodynamic configurations, and flight envelopes. E.H.W.

N72-32002 Aerospace Research Labs., Wright-Patterson AFB, Ohio.
SOME DESIGN ASPECTS OF HYPERSONIC VEHICLES
W. L. Hankey *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 25 p refs (For availability see N72-31994 23-01)

Methods for determining optimum design parameters of hypersonic lifting vehicles are given. Data cover trajectory and flight environment, conditions of the boundary layer, hypersonic aerodynamic characteristics, landing capability, low speed maneuverability, and type of configuration. E.H.W.

N72-32003 Southampton Univ. (England).
REAL GAS EFFECTS ON LIFTING REENTRY AEROTHERMODYNAMICS
K. N. C. Bray *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol 1. Jul. 1972 19 p refs (For availability see N72-31994 23-01)

A review on the effects of nonequilibrium flow on space shuttle vehicle aerodynamics is presented. Objectives of the review are: (1) to estimate flight conditions under which nonequilibrium flow will occur; (2) to assess whether consequences of nonequilibrium flow may be important to vehicle design; (3) to discuss the adequacy of available methods of prediction for solving nonequilibrium flow problems likely to arise during design of a space shuttle; and (4) to describe difficulties which will arise in attempting wind tunnel simulation of nonequilibrium flow past space shuttle shapes under reentry conditions. Author

N72-32004 Imperial Coll. of Science and Technology, London (England).
VISCOUS INTERACTION EFFECTS ON REENTRY AEROTHERMODYNAMICS: THEORY AND EXPERIMENTAL RESULTS
J. L. Stollery *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 1 Jul. 1972 28 p refs (For availability see N72-31994 23-01)

The effects of viscous interaction on reentry aerothermodynamics near a sharp leading edge, a blunt body, and a shock boundary layer at hypersonic and supersonic speeds are investigated. E.H.W.

N72-32005# Joint Publications Research Service, Arlington, Va.
REPORTS FROM THE HIGHER EDUCATIONAL INSTITUTIONS: AVIATION TECHNOLOGY
S. D. Yermolenko, V. G. Khrapovitskiy, M. T. Barinov, and A. V. Rovnykh 26 Sep. 1972 48 p refs Transl. into ENGLISH from

Izv. Vyssh. Ucheb. Zaved., Aviats. Tekh. (Kazan), no. 4, 1969 p 5-16, no. 1, 1968 p 10-20, no. 2, 1967 p 3-11, and no. 3, 1966 p 3-10
(JPRS-57100) Avail: NTIS HC $4.50

Selected articles on the aerodynamic characteristics of lifting surfaces are presented. For individual titles, see N72-32006 through N72-32009.

N72-32006 Joint Publications Research Service, Arlington, Va.
ON THE INFLUENCE OF THE COMPRESSIBILITY OF AIR ON THE AERODYNAMIC CHARACTERISTICS OF A WING MOVING CLOSE TO THE EARTH'S SURFACE AT SUBSONIC SPEEDS
In its Rept. from the Higher Educational Inst.: Aviation Tech. 26 Sep. 1972 p 1-14 refs (For availability see N72-32005 23-01)

The effect of the proximity of the earth's surface on the aerodynamic characteristics of a horizontal wing is investigated by using a mirror image of the wing with respect to the earth's surface. Based on the Bio-Savara formula, the nonflow conditions are developed; downwash angles, and aerodynamic force coefficients are calculated for different attack angles. It is concluded that in the ranges of attack angles of practical interest, and for wings with span-chord ratios less than five, stability increases slightly with increase in speed. F.O.S.

N72-32007 Joint Publications Research Service, Arlington, Va.
CALCULATION OF THE AERODYNAMIC CHARACTERISTICS OF LIFTING SYSTEMS COMPOSED OF RECTANGULAR WINGS
In its Rept. from the Higher Educational Inst.: Aviation Tech. 26 Sep. 1972 p 15-26 refs (For availability see N72-32005 23-01)

Calculative methods based on the nonlinear theory are applied to systems of rectangular wings arranged one behind the other. Systems of thin rectangular wings in a uniform stream of incompressible fluid are examined for any angle of attack that is less than the wing stall angle. Using the Bio-Savara formula, the projections of the velocity induced by a single horseshoe vortex are calculated. The results of calculating systems of two wings with different span-chord ratios are summarized in graphs. The results are in close agreement with those obtained experimentally. F.O.S.

N72-32008 Joint Publications Research Service, Arlington, Va.
ON THE NONLINEAR THEORY OF LIFTING SURFACES
In its Rept. from the Higher Educational Inst.: Aviation Tech. 26 Sep. 1972 p 27-36 refs (For availability see N72-32005 23-01)

A solution to the problem of the forces acting on a lifting surface in a stream of incompressible fluid is proposed that considers a rectangular wing to be a flat plate, which is replaced with a vortex surface. The downwash angles of free vortices are computed, and the formula for calculating the velocity induced by a single horseshoe vortex is derived. The calculated aerodynamic coefficients of wings for various span-chord ratios are in agreement with experimental data. F.O.S.

N72-32009 Joint Publications Research Service, Arlington, Va.
CALCULATING THE DOWNWASH ANGLES BEHIND WINGS WITH SMALL SPANCHORD RATIOS MOVING AT SUBSONIC SPEEDS, ACCORDING TO NONLINEAR THEORY
In its Rept. from the Higher Educational Inst.: Aviation Tech. 26 Sep. 1972 p 3-10 refs (For availability see N72-32005 23-01)

A method is presented for calculating downwash angles of the flow for rectangular wings with small span-chord ratios. The problem is reduced to the solution of nonlinear algebraic equations by successive approximations. To obtain acceptable accuracy in the calculated results, the wing is replaced by two vortices. F.O.S.

N72-32010*# Scientific Translation Service, Santa Barbara, Calif.
ON THE COMPUTATION OF THE NOSE PORTION OF A WING PROFILE IN SONIC FLOW
Yu. B. Lifshits Washington NASA Sep. 1972 9 p refs Transl. into ENGLISH from Uchenyye Zapiski TsAGI (USSR), v. 2, no. 4, 1971 p 1-6
(Contract NASw-2035)
(NASA-TT-F-14285) Avail: NTIS HC $3.00 CSCL 01A

A numerical method developed earlier is used to calculate the flow of sonic velocity at infinity around three series of symmetrical profiles, each of which is characterized by a certain two-parametric law governing the curvature change. The results obtained are the basis for establishing the properties of transonic flows around a profile. Author

N72-32011# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Aeronautical Engineering.
EXPERIMENTAL STUDY OF INDUCED DRAG AND LEADING EDGE TANGENTIAL SUCTION FORCE SPANWISE DISTRIBUTION OF THIN PLANE DELTA WINGS AT LOW SPEEDS INCLUDING THE EFFECTS OF FUSELAGE DIAMETER
Sven-Olof Ridder 1972 52 p refs
(KTH-AERO-TN-58) Avail: NTIS HC $4.75

The spanwise distribution of the leading edge tangential suction forces along the leading edge of a thin 60 degree delta wing has been obtained by means of a novel experimental method. This method is based on measurements of the pressure at the apex of the leading edge at various spanwise stations. The tests were carried out in a low speed wind tunnel, and also the total forces and moments were recorded. The delta wing was tested alone and in combination with two schematic fuselages of different diameters. It was found that the presence of a fuselage reduces the leading edge suction in the vicinity of the fuselage, but slightly increases the suction near the wing tips. Another effect of the fuselage was to reduce the lift curve slope and the span efficiency factor. The effects were small for the smaller fuselage of typical aircraft-proportions, but fairly pronounced for the larger fuselage of typical missile proportions. Author

N72-32012*# National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF THE VORTEX SPRINGING FROM A HELICOPTER BLADE TIP ON THE FLOW AROUND THE NEXT BLADE
Bernard Monnerie and Alain Tognet Feb. 1972 22 p refs Transl. into ENGLISH from Aeronaut. Astronaut. (Paris), no. 29, 1971 p 24-32
(NASA-TT-F-14462) Avail: NTIS HC $3.25 CSCL 01A

A wind tunnel investigation of the path of the vortex springing from each rotor blade tip of a helicopter rotor was conducted. Analysis of the path of the vortex makes it possible to define the position of a blade relative to the various vortices during a cycle. One of the positions was simulated in the wind tunnel by mounting two half-blades on the wall. The effects of the vortex on the overall forces and the pressure distribution were determined. The wind tunnel results are compared with those obtained by numerical analysis. Author

N72-32753 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
AERODYNAMIC PROBLEMS, PART 4 [PROBLEMES AERODYNAMIQUES, PARTIE 4]
Rene Ceresuela *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 2 Jul. 1972 p 95-122 refs In FRENCH (For availability see N72-32749 23-28)

02 AIRCRAFT

Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc; and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

N72-32013 Engineering Sciences Data Unit, London (England).
FRICTIONAL AND RETARDING FORCES ON AIRCRAFT TYRES. PART 2: ESTIMATION OF BRAKING FORCE
Oct. 1971 50 p Sponsored by Roy. Aeron. Soc.
(ESDU-71026-Pt-2) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Numerical procedures for determining the frictional and retarding forces on aircraft tires are presented. The subjects discussed are: (1) coefficient of friction for unyawed tires in both braked and skidding conditions on hard surface runways, (2) limits of braking force due to brake energy and torque considerations, (3) maximum and locked-wheel tire-runway braking forces, and (4) mean effective braking force developed during period of braking, either manual or automatic. Mathematical models and graphs are included to support the theoretical presentation. Author

N72-32014 Royal Aeronautical Society, London (England).
ESTIMATION OF TAKE-OFF DISTANCE
Jan. 1971 8 p refs
(EG-5/1-Amend-A) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Mathematical models and formulas are presented for estimating the take-off distance over a screen, usually 35 to 50 feet high. Information on the calculation of accelerate-stop distances is also included. The methods apply to all types of propulsive units. A summary of methods for estimating take-off distance is provided. Author

N72-32015 Engineering Sciences Data Unit, London (England).
AVERAGE GUST FREQUENCIES SUBSONIC TRANSPORT AIRCRAFT
Sep. 1969 19 p refs Supersedes ESDU-Fat-L.01.01 Sponsored by Roy. Aeron. Soc.
(ESDU-69023-Amend-B; ESDU-Fat-L.01.01) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The measurement of the average gust frequencies on subsonic transport aircraft is discussed. The results were derived from accelerometer, VG, and VGH records reported during aircraft operations. Special gust investigations at high and low altitude conditions, as well as contour flying, are presented. Mathematical models and charts are developed to support the theoretical discussions. Author

N72-32016*# California Univ., Berkeley. Inst. of Governmental Studies.
LONGER TERM CONSEQUENCES OF THE SHORT TAKE-OFF AND LANDING (STOL) AIRCRAFT SYSTEM Semiannual Report, 1 Nov. 1971 - 30 Mar. 1972
Todd R. LaPorte Jul. 1972 43 p refs
(Grant NGR-05-003-0471)
(NASA-CR-128197) Avail: NTIS HC $4.25 CSCL 01B

An assessment of the STOL aircraft and the various means of employing it are discussed in the light of a research study to evaluate the efficacy of such analyses. It was determined that current approaches to assessment are generally inadequate for investigating the full social consequences of implementing a new technology. It is stated that a meaningful methodology of technology assessment must reflect mechanisms underlying the relationship of technology to social change. Interrelated methods which are discussed are: (1) gaming and simulation as heurisitic approaches in analysis and inquiry, (2) long range planning and questions of the future, (3) planning theory as a background for critical analysis of policy planning, and (4) social theory, with particular emphasis on social change and systems theories. Author

N72-32017# Advisory Group for Aerospace Research and Development, Paris (France).
HANDLING QUALITIES CRITERIA
Jun. 1972 293 p refs Proc. of the AGARD Flight Mech. Panel Specialists Meeting, Ottawa, 28 Sep.-1 Oct. 1971
(AGARD-CP-106) Avail: NTIS HC $17.00

The proceedings of a conference on the handling qualities of aircraft are presented. Subjects discussed are: (1) flying qualities requirements and criteria for conventional and V/STOL aircraft, (2) commercial flying quality standards and flight test validation, (3) establishment of flying qualities by analysis of current aircraft, simulation and analysis, and pilot opinion ratings, (4) special problems and interfaces in aircraft control, and (5) man machine relationships and research and development projects for improvement. For individual titles, see N72-32018 through N72-32038.

N72-32018 Service Technique Aeronautique, Paris (France).
COMPARISON OF FRENCH AND UNITED STATES FLYING QUALITIES REQUIREMENTS
Jean-Claude Wanner and John W. Carlson (ASD) *In* AGARD Handling Qualities Criteria Jun. 1972 15 p (For availability see N72-32017 23-02)

The flying qualities requirements for French and United States aircraft are compared. It was determined that the two sets of criteria are basically the same in intent and goals. The complications in applying these criteria to modern, high performance aircraft are discussed. Concepts in level of handling qualities, application of flight envelope restrictions, and effects of system failures on flying properties are examined. Author

N72-32019 Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
THE NATURE AND USE OF THE RULES FOR JUDGING THE ACCEPTABILITY OF THE FLYING QUALITIES OF FIXED WING AIRCRAFT
S. J. Andrews *In* AGARD Handling Qualities Criteria Jun. 1972 10 p ref (For availability see N72-32017 23-02)

The flying qualities requirements for the United Kingdom and the United States are compared. The documents involved in establishing the criteria are examined. The general content of the documents in relation to the requirements of the flight tester in assessing the acceptability of fighter aircraft, strike aircraft, and trainer aircraft is discussed. Comment is submitted on the flying qualities requirements for V/STOL aircraft. It is suggested that the requirements documents are of limited use to the flight tester because they are either out of date or inapplicable to new aircraft with special role demands or novel design features. It is recommended that, in addition to updating existing requirements, more attention should be given to the direct and immediate application of data from known and tried service aircraft. Author

N72-32020 Federal Aviation Administration, Washington, D.C.
FAA FLYING QUALITIES REQUIREMENTS
Richard Sliff and Robert F. LeSuer *In* AGARD Handling Qualities Criteria Jun. 1972 6 p (For availability see N72-32017 23-02)

The need for flexibility and change of Federal Aviation Regulations to accommodate new designs and innovations to flying vehicles is an ever-increasing and complex situation. The current philosophies and projected difficult areas associated with airplane handling qualities are discussed. The subject is not

intended to be covered as to the specific conditions or types of airplanes but, rather, to cover the qualitative evaluation needs for determining compliance with the existing airworthiness rules. Recognizing that aircraft development and capability is an ever-improving science, the relationship of Federal rulemaking procedures to the application of judgment in the requirements to produce timely and adequate determinations of compliance is discussed with consideration of complex control systems and rapidly-expanding flight envelopes. Author

N72-32021* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

REVISIONS TO V/STOL HANDLING QUALITIES CRITERIA OF AGARD REPORT 408

Seth B. Anderson and Laurel G. Schroers (Army Air Mobility Res. and Develop. Lab., Moffett Field, Calif.) *In* AGARD Handling Qualities Criteria Jun. 1972 8 p refs (For availability see N72-32017 23-02)

A brief review of selected handling qualities criteria for V/STOL aircraft shows that although a clearer understanding of the requirements for controversial areas such as roll control power, vertical flight path control, and transition is in hand, considerably more research is needed to refine these criteria for operational IFR activity. Because many items interact to influence the pilots' overall impression of the aircraft's behaviour, additional work of a systematic nature must be done to clarify this aspect. A better definition of a gust model which includes discrete gust effects is needed to firm up criteria for both hover and STOL operation. Author

N72-32022 Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

US MILITARY V/STOL HANDLING QUALITY REQUIREMENTS

Charles R. Chalk and Charles B. Westbrook (AFFDL) *In* AGARD Handling Qualities Criteria Jun. 1972 13 p refs (For availability see N72-32017 23-02)

The V/STOL aircraft handling qualities criteria specification is discussed. The evolution of the specification is traced over the five year period of its development. Problem areas requiring additional work are defined as well as research efforts to address some of the problem areas. Author

N72-32023 Canadair, Ltd., Montreal (Quebec).

APPLICATION OF V/STOL HANDLING QUALITIES CRITERIA TO THE CL-84 AIRCRAFT

O. E. Michaelsen *In* AGARD Handling Qualities Criteria Jun. 1972 26 p refs (For availability see N72-32017 23-02)

The design concepts and flight characteristics of the Canadair CL-84 tilt wing V/STOL aircraft as related to handling qualities are reviewed. The achieved characteristics are compared with the revised AGARD V/STOL Handling Qualities Criteria. It is shown that the CL-84 characteristics are in general accord with the Criteria. While a few of the Criteria values appear inappropriate for the CL-84, it is concluded that the handling qualities of the aircraft would be improved if the aircraft met most of the Criteria in the areas where it presently falls short. Author

N72-32024 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).

V/STOL HANDLING QUALITIES CRITERIA COMPARED WITH FLIGHT TEST RESULTS OF THE V/STOL SUPERSONIC FIGHTER VJ 101C AND THE V/STOL TRANSPORT AIRCRAFT DO 31E

G. K. Kissel and Horst Wuennenberg (Dornier AG, Friedrichshafen) *In* AGARD Handling Qualities Criteria Jun. 1971 15 p refs (For availability see N72-32017 23-02)

The V/STOL aircraft handling qualities criteria are compared with the flight test results for the VJ 101C V/STOL supersonic fighter aircraft and the DO 31E V/STOL transport aircraft. The main features of the takeoff and landing procedures are presented. The handling qualities of the two aircraft in hover and transition flights are compared with accepted recommendations. The influence of the stabilization system and its characteristics on the control power is examined. The effects of the jet induced downwash and of the hot gas recirculation are shown. Author

N72-32025 Air Force Flight Test Center, Edwards AFB, Calif. Performance and Flying Qualities Branch.

CRITERIA TRENDS OBTAINED FROM ANALYSIS OF CURRENT AIRCRAFT

Charles F. Adolph *In* AGARD Handling Qualities Criteria Jun. 1972 9 p refs (For availability see N72-32017 23-02)

The need for developing additional criteria specifically for evaluation purposes is discussed. Also included are discussions of several other topics in the flying qualities area which have been recurrent items of interest in evaluations of high performance aircraft. Included are comments on high angle of attack criteria, an overview of the results from evaluations of aircraft equipped with control augmentation systems, and a summary of experiences in applying flying quality criteria. Author

N72-32026 Northrop Corp., Hawthorne, Calif.

SIMULATION AND ANALYSIS IN ESTABLISHING FLYING QUALITIES CRITERIA

J. T. Gallagher *In* AGARD Handling Qualities Criteria Jun. 1972 25 p refs (For availability see N72-32017 23-02)

The application of simulation and analysis in establishing the flying qualities criteria for piloted aircraft is discussed. Two areas are identified where better criteria are needed in the specification: (1) the effects of turbulence and (2) the impact of control system dynamics on flying qualities. A discussion is presented on a program which employs ground based simulation and pilot analysis in an attempt to better define the impact of turbulence on flying qualities. Methods for overcoming existing shortcomings in the procedure are evaluated. Author

N72-32027 Boeing Co., Seattle, Wash.

HANDLING QUALITIES CRITERIA FOR SUPERSONIC TRANSPORT

W. T. Kehrer *In* AGARD Handling Qualities Criteria Jun. 1972 .5 p (For availability see N72-32017 23-02)

The content and tone of a criteria specification for commercial transports are presented. A criteria must insure safe handling qualities for all regimes of flight operation. In addition to the normal flight operations, operation to the extremes of the flight envelope, and operation in severe turbulence must be specified. Also to be considered are flight operations with systems failures. A criteria specification must also consider the critical combinations of these items that have a reasonable probability of occurrence. For example: the airplane must be able to operate safely in turbulence of some specified level following flight controls systems failures. Author

N72-32028 Cornell Aeronautical Lab., Inc., Buffalo, N.Y. Flight Research Dept.

THE ROLE OF PILOT RATING IN THE DEVELOPMENT OF HANDLING CRITERIA

Robert P. Harper, Jr. *In* AGARD Handling Qualities Criteria Jun. 1972 7 p refs (For availability see N72-32017 23-02)

The application of pilot rating in determining the performance and handling criteria of aircraft is discussed. The role of pilot rating as a means of defining the quality of handling in those control situations where a direct measurement cannot be made is described. The development and application of a pilot rating scale for aircraft evaluation are examined. Author

N72-32029 London Univ. (England). Dept. of Aeronautical Engineering.

CRITERIA FOR STALL AND POST STALL GYRATIONS

G. J. Hancock *In* AGARD Handling Qualities Criteria Jun. 1972 10 p (For availability see N72-32017 23-02)

Problems associated with the handling characteristics during

approaches to and excursions beyond the operational limits of commercial aircraft are discussed. The evolution of airworthiness requirements for the stall and post stall operation of aircraft is described. The effects of minimum speed in steady level flight, the specification of the factors of safety, and the demonstration of satisfactory dynamic behavior beyond the operational limits on the design of the aircraft are analyzed. Author

N72-32030 Royal Aircraft Establishment, Bedford (England).
TURBULENCE MODELS FOR THE ASSESSMENT OF HANDLING QUALITIES DURING TAKE OFF AND LANDING
J. G. Jones *In* AGARD Handling Qualities Criteria Jun. 1972 15 p refs (For availability see N72-32017 23-02)

Properties of atmospheric turbulence at low altitude are reviewed, with particular reference to those aspects relevant to an aircraft on a landing approach or during take-off. Measurements of power spectra are described and related to a simplified theoretical model. Looking beyond the power spectrum, an important property of turbulence is its intermittency, related to a tendency for aircraft response to show large peaks separated by regions of relative inactivity. Pilots appear to be particularly sensitive to this intermittent structure, and their subjective comments can be related to measured turbulence characteristics. It is shown how a discrete gust model for turbulence may be employed to predict the magnitude of large response peaks. As an example, the response to gusts of an aircraft constrained to fly at constant attitude is discussed, with particular reference to the effects of aircraft speed. Author

N72-32031 North American Rockwell Corp., Los Angeles, Calif.
FLYING QUALITIES INTERACTION WITH ELASTIC AIRFRAMES
John H. Wykes *In* AGARD Handling Qualities Criteria Jun. 1972 13 p refs (For availability see N72-32017 23-02)

The trends in modern aircraft structural design and aerodynamics are such that vehicle flexibility increasingly impacts on vehicle flying (handling) qualities and the design processes necessary to provide satisfactory vehicles. In recent years, the flexibility effects on ride quality have impacted on handling qualities and, perhaps, should be added to handling qualities requirements or criteria. A presentation is given of some of the approaches currently being considered to reduce this interaction. These include such techniques as active seat isolation and active structural mode control. It is concluded that any ride quality solution method that includes inducing motion between the pilot and his controls and displays should be excluded by handling qualities criteria. The structural flexibility and flight controls interface is briefly examined, and a typical pilot-induced structural excitation is discussed. It is suggested that a pilot prefilter, a modern stability augmentation system, and a structural mode control system designed to meet ride quality criteria can solve the problem without additional criteria. The handling qualities flexibility interaction and the vehicle design cycle are discussed. Author

N72-32032 Societe Nationale Industrielle Aerospatiale, Toulouse (France).
INFLUENCE OF THE DESIGN AND FUNCTIONING CHARACTERISTICS OF THE FLYING CONTROL SYSTEM OF A TRANSPORT AIRCRAFT ON ITS FLIGHT QUALITIES
R. Deque *In* AGARD Handling Qualities Criteria Jun. 1972 12 p (For availability see N72-32017 23-02)

The problems encountered in the course of flying quality studies for both a supersonic and a subsonic transport aircraft are described. A study is made of the influence of the static and dynamic characteristics of controls between cockpit controls and surfaces without automatic compensators. The specific problems raised by automatic compensators are examined. A study is made of how flying qualities are affected by flying control failures and by the safety and reliability objectives which must as a consequence be achieved. Author

N72-32033 National Aeronautical Establishment, Ottawa (Ontario).
PARAMETERS AFFECTING LATERAL DIRECTIONAL HANDLING QUALITIES AT LOW SPEEDS
K-H. Doetsch, Jr. *In* AGARD Handling Qualities Criteria Jun. 1972 13 p ref (For availability see N72-32017 23-02)

A study is undertaken of the factors affecting the lateral-directional handling qualities of aircraft in typical VMC STOL flight as certain modal parameters are varied. It is found that for the low flight-speed and the low dutch roll frequencies investigated, the side force equation takes on added significance in establishing the oscillatory mode through the vector contribution of the weight component acting along the y-axis. When this contribution is large, secondary effects on handling qualities can arise if the relationship between the yaw rate and sideslip vectors in the oscillatory mode is established solely by varying the derivatives of the moment equations because, under these circumstances, unusual groups of derivatives may be necessary to satisfy the imposed constraints. Similar deviations from normal values for the moment derivatives may be required to force the zeros from the poles in the bank angle to aileron-control transfer function while simultaneously maintaining the correct vector relationships in the oscillatory mode. Author

N72-32034 Technische Hogeschool, Delft (Netherlands).
PILOT VEHICLE ANALYSIS
R. J. A. W. Hosman *In* AGARD Handling Qualities Criteria Jun. 1972 25 p refs (For availability see N72-32017 23-02)

An experiment is described in which measurements were performed on human operators in single axis tracking tasks. The controlled element used was a simulated transport aircraft, the angle of pitch was controlled by the human operator. The forcing function was a gust signal acting on the simulated aircraft. The aircraft was simulated at three centre of gravity positions at which it was stable, neutral and unstable respectively. During the test runs the human operators had to perform simultaneously an auditory additional task. On the basis of the results obtained from this experiment a new sampled data pilot model is discussed. Author

N72-32035 Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
PILOT WORKLOAD
R. K. Bernotat and Jean-Claude Wanner (Service Tech. Aeronautique, Paris) *In* AGARD Handling Qualities Criteria Jun. 1972 9 p refs (For availability see N72-32017 23-02)

Schematic diagrams and analyses of the functions of the human operator in the guidance and control loops are presented. Three hierarchical control loops are considered. Flow charts are established to define the stimuli received by the pilot, the data treatment by the brain, and the subsequent physical actions. The application of the analyses to establishing the pilot workload encountered for various portions of the flight is described. Author

N72-32036 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
THEORETICAL PILOT RATING PREDICTIONS
Ronald O. Anderson *In* AGARD Handling Qualities Criteria Jun. 1972 14 p refs (For availability see N72-32017 23-02)

Methods for specifying flying qualities of aircraft are discussed. Methods for correcting deficiencies in the present system are recommended. The recommendations range from the expansion of the classical approach to new dimensions to approaches that rely on theoretical predictions of pilot ratings. It is shown that the prediction of pilot ratings is a valid approach which is accurate within the range of pilot variability. Author

N72-32037 Naval Air Systems Command, Washington, D.C.
RECENT US NAVY FLYING QUALITIES RESEARCH
Raymond F. Siewert *In* AGARD Handling Qualities Criteria Jun. 1972 12 p refs (For availability see N72-32017 23-02)

The results of U.S. Navy sponsored flying qualities research conducted over the past five years are presented. Inflight variable stability airplane investigations were conducted in simulated carrier approaches to determine the effect of the principle flying qualities parameters on approach performance. Limits have been established on the values of the major longitudinal and lateral-directional parameters, to insure good carrier approach characteristics. In addition to the carrier approach studies, moving base simulator investigations were conducted to further develop criteria, and extend the aircraft maneuvering potential at high angles-of-attack. The inclusion of maneuvering force gradient and/or stick sensitivity has been determined as a requirement for a meaningful criterion. Author

N72-32038* National Aeronautics and Space Administration, Washington, D.C.

RECENT NASA HANDLING QUALITIES RESEARCH

Richard J. Wasicko *In* AGARD Handling Qualities Criteria Jun. 1972 25 p refs (For availability see N72-32017 23-02)

A comprehensive review of NASA research results documented since the mid-1960's and some recently completed programs on aircraft handling qualities are presented. In addition to handling qualities research pertaining to vehicle stability and control characteristics, investigations related to specialized piloting tasks, cockpit displays, and environmental factors are summarized. The background leading to NASA's handling qualities research activities is discussed, and programs that have received major emphasis are indicated. For general aviation aircraft, the survey includes investigations aimed at improving handling qualities by incorporating increasingly sophisticated stability augmentation and display systems, simplifying the approach and landing task for relatively inexperienced pilots, and establishing the basic effects of turbulence. Research on the specialized piloting problem of steeper instrument approaches for noise abatement and investigations with a representative first generation aircraft are reviewed in the section on subsonic jet transports. Supersonic cruise aircraft programs include a variety of simulation studies related to supersonic transport designs and flight tests with the XB-70 aircraft. Investigations of high angle of attack loss of control problems and a flight study of direct lift control utilization for formation flying and aerial refueling are discussed in the review of tactical military aircraft research. Author

N72-32039# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.

DYNAMIC STABILITY MEASUREMENT OF A LIFTING BODY CONFIGURATION AT HYPERSONIC SPEEDS, PART 4 Final Report

Stig Lundgren Dec. 1971 30 p refs
(AU-648-Pt-4) Avail: NTIS HC $3.50

The Dynamic stability derivatives were measured in a wind tunnel on lifting body configurations at Mach numbers M = 4 and M = 7 using a free-oscillation technique. The model configuration was suggested by MBB in Munich, Germany. Model design and manufacture was made at FFA. The wind tunnel tests were conducted in the FFA hypersonic wind tunnel Hyp 500 at reduced frequencies between 0.006-0.013 and three pitching axis positions, and were performed using transient excitation, and random excitation. The results from the two methods agreed, in those cases where they could be compared, within 10%. The accuracy of the data obtained from transient excitation were better than 12%. Author

N72-32040*# Systems Control, Inc., Palo Alto, Calif.

ANALYSIS OF INSTRUMENTATION ERROR EFFECTS ON THE IDENTIFICATION ACCURACY OF AIRCRAFT PARAMETERS

John A. Sorensen Washington NASA 31 May 1972 104 p refs
(Contract NAS1-10791)
(NASA-CR-112121) Avail: NTIS HC $7.25 CSCL 01D

An analytical investigation is presented of the effect of unmodeled measurement system errors on the accuracy of aircraft stability and control derivatives identified from flight test data. Such error sources include biases, scale factor errors, instrument position errors, misalignments, and instrument dynamics. Two techniques (ensemble analysis and simulated data analysis) are formulated to determine the quantitative variations to the identified parameters resulting from the unmodeled instrumentation errors. The parameter accuracy that would result from flight tests of the F-4C aircraft with typical quality instrumentation is determined using these techniques. It is shown that unmodeled instrument errors can greatly increase the uncertainty in the value of the identified parameters. General recommendations are made of procedures to be followed to insure that the measurement system associated with identifying stability and control derivatives from flight test provides sufficient accuracy. Author

N72-32041*# Systems Control, Inc., Palo Alto, Calif.

SCIP2 FLIGHT INSTRUMENTATION SPECIFICATION FOR PARAMETER IDENTIFICATION: USER'S GUIDE

N. Taniguchi Washington NASA May 1972 137 p
(Contract NAS1-10791)
(NASA-CR-112122) Avail: NTIS HC $9.00 CSCL 01D

SCIP2 which is a digital computer program that can be used to investigate the effects of instrumentation errors on the accuracy of aircraft stability and control derivatives identified from flight test data is presented. The program is based on the assumptions that the aircraft differential equations of motion are linear and consist of small perturbations about a quasisteady flight condition. It is also assumed that a Newton-Raphson optimization technique is used for identifying the estimates of the parameters. A summary of the equations which are coded in the program are included. Author

N72-32042*# National Aeronautics and Space Administration, Washington, D.C.

STUDY OF AIRCRAFT NOISE DURING TAKE-OFF

Marc Pianko Feb. 1972 30 p Transl. into ENGLISH from Aeronaut. Astronaut. (Paris), no. 18, 1970-1972 p 4-14
(NASA-TT-F-14468) Avail: NTIS HC $3.50 CSCL 01B

The optimum paths providing for minimization of the noise level of an aircraft during take-off are studied. Determination of those paths emphasizes the aircraft parameter which, apart from engine noise, establish the noise intensity at take-off. The relative effect of each parameter is evaluated. The influence of engine technology, its restrictions and limitations on future progress in the field of take-off noise is examined. The extent to which the results may be altered by the introduction of the effective PNdB (duration correction) is analyzed. Author

N72-32043*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

JET AIRCRAFT ENGINE NOISE REDUCTION

E. William Conrad and Carl C. Ciepluch 1972 11 p refs Presented at EASCON '72, Washington, D. C., 16-17 Oct. 1972
(NASA-TM-X-68131; E-7123) Avail: NTIS HC $3.00 CSCL 01B

The development of advanced technology to reduce the effects of aircraft flyover noise is described. The procedures are directed toward identifying and minimizing the noise sources in aircraft engines and to absorbing noises which cannot be eliminated. The economic impact resulting from reducing noise levels is examined. Improvements in engine noise reduction technology are discussed. Author

N72-32044*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

DYNAMIC STABILITY DERIVATIVES AT ANGLES OF ATTACK FROM MINUS 5 DEG TO 90 DEG FOR A VARIABLE-SWEEP FIGHTER CONFIGURATION WITH TWIN VERTICAL TAILS

Sue B. Grafton and Ernie L. Anglin Washington Oct. 1972

52 p refs
(NASA-TN-D-6909; L-8426) Avail: NTIS HC $3.00 CSCL 01B

An investigation was conducted in the Langley full-scale tunnel to determine the dynamic stability derivatives in pitch, roll, and yaw over an angle-of-attack range of -5 deg to 90 deg for a variable-sweep fighter configuration with twin vertical tails. The study consisted of forced-oscillation tests of a 1/10-scale model of the airplane at a Reynolds number of 0.4 million based on the reference wing mean aerodynamic chord. Tests were conducted for wing sweep angles of 22 deg, 35 deg, 50 deg, and 68 deg, and the effects of the vertical and horizontal tails, wing leading-edge slats, nose-mounted canards, and frequency of the oscillation were also evaluated. Author

N72-32045*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THREE-TRACK RUNWAY AND TAXIWAY PROFILES MEASURED AT INTERNATIONAL AIRPORTS I AND J
Albert W. Hall Washington Oct. 1972 92 p refs
(NASA-TN-D-6932; L-8485) Avail: NTIS HC $3.00 CSCL 01B

Three-track runway and taxiway profiles are presented for use in studies of airplane response to ground roughness. Tabulated and plotted data for two international airports, (designated I and J), are included. Author

N72-32046# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
SPECIAL STUDY: MIDAIR COLLISIONS IN US CIVIL AVIATION, 1969 - 1970
7 Jun. 1972 81 p refs
(NTSB-AAS-72-6) Avail: NTIS HC $6.25

A special study of midair collisions in U.S. civil aviation during 1969 to 1970 is presented. The study analyzes the commonality of midair collisions of aircraft as an accident prevention measure. The functions of the National Transportation Safety Board are discussed. Author

N72-32047*# Addis Translations International, Woodside, Calif.
DETERMINING THE SOUND FIELD PRODUCED BY THE MANEUVERING OF JET AIRCRAFT
Michel Kobrynski Washington NASA Mar. 1972 27 p refs Transl. into ENGLISH of "Determination du Champ Sonore Produit par l'Evolution des Avions a Reaction", ONERA preprint TP-697, 1969 16 p Sponsored by NASA
(NASA-TT-F-14489; TP-697) Avail: NTIS HC $3.50 CSCL 01B

The relation between the total sound-pressure field emitted by a stationary rotating jet and the sound field from that same jet in motion, observed at a fixed point on the ground, is studied by introducing into the generalized equation for the local over-all sound-pressure level, whose form is recalled, a new convection index derived from the Ribner expression. The influence of the flight speed on the sound emission is demonstrated over a broad range of angles (from 20 to 160 deg with respect to the jet axis). Deduced from it are the relation between the convection effect of the vortices in stationary and moving jets, and the variation of the acoustic power produced by propulsion of the jet through the atmosphere. The results of the analytic study, confirmed by many experimental findings, have shown that at the different angles of acoustic radiation the relative speed is not the significant parameter to use for determining the levels of the local over-all sound pressure. Author

N72-32048# Air Pollution Control District, Los Angeles, Calif.
JET AIRCRAFT OPERATIONS: A THREAT TO THE AIR ENVIRONMENT
Ralph E. George, John S. Nevitt, and Julien A. Verssen 30 Jun. 1971 38 p refs Presented at 64th Ann. Meeting of the Air Pollution Control Assoc., Atlantic City, 30 Jun. 1971
(Contract CPA-22-69-137)
(Paper-71-117) Avail: NTIS HC $4.00

A summary is presented of the results of a comprehensive air pollution study of jet aircraft operations at the Los Angeles International Airport. Included in the data obtained from this study are: (1) jet engine exhaust measurements for currently used turboprop, turbojet and turbofan engines, (2) measurements of specific contaminants in the atmosphere inside and outside of passenger terminals and ticketing areas, and in aircraft cabins during ground operations including passenger loading and taxiing prior to takeoff; and (3) ambient air measurements in a two-mile radius of the airport. An evaluation is made of the emissions of contaminants from air transport operations and all related ground activities including motor vehicles, that contribute to the total atmospheric contaminant burden at the airport. Author

N72-32049# Sandia Labs., Albuquerque, N.Mex.
FORMULATION OF THE EQUATIONS OF MOTION FOR FLIGHT VEHICLES WITH SEMIPASSIVE ROLL CONTROL SYSTEMS
John K. Kryvoruka Apr. 1972 50 p refs
(Contract AT(29-1)-789)
(SCL-RR-720007) Avail: NTIS

The relations which govern a class of semi-passive, roll control systems utilized by the vehicle for flight stability augmentation are included. Particular attention is given to the construction of a comprehensive aerodynamic model which is general for most applications. The development is suitable for programming on a large-scale digital or hybrid computer. Author

N72-32050# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
STUDY OF FLIGHT-LOAD PARAMETERS OF THE NAVY FLIGHT DEMONSTRATION TEAM F-4J AIRCRAFT Final Report
Robert J. McAvoy and David J. Rhoads 25 Feb. 1972 346 p refs
(AD-743476; NADC-72021-VT) Avail: NTIS CSCL 01/3

The report presents 42.9 hours of valid flight loads data recorded on three F-4J aircraft assigned to the Navy Flight Demonstration Team (Blue Angels). The data includes both practice sessions and official flight demonstrations during the months of May and June 1970. Histograms, graphs, and tables are used to describe the load histories of the aircraft during the study. In addition, data comparisons are made of the flight loads recorded at three different locations on the aircraft structure, and these loads are also compared to load counts recorded by the Navy statistical counting accelerometer. As a result of this study, the Navy counting accelerometer transducer was relocated to the center of gravity of all the Navy Flight Demonstration Team F-4J aircraft. Additional important recommendations are made as a result of this study. Author (GRA)

N72-32051# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE M MARK
Karl-Heinz Eyermann 4 Apr. 1972 17 p Transl. into ENGLISH from Armee Rundschau (East Germany), no. 1, 1971 p 88-92
(AD-744159; FTD-HT-23-1491-71) Avail: NTIS CSCL 01/3

The report lauds the superiority of Russia's nuclear weapons over the USA, and the designer Valdimir Mikhaylovich Myasishchev for the M-4 long-range aircraft. Author (GRA)

N72-32052# School of Aerospace Medicine, Brooks AFB, Tex.
NOISE WITHIN FIXED-WING UTILITY AIRCRAFT USED BY THE MILITARY Progress Report, Mar. - Sep. 1971
Donald C. Gasaway Dec. 1971 26 p refs
(AF Proj. 7755)
(AD-742972; SAM-TR-71-43) Avail: NTIS CSCL 01/3

A variety of small fixed-wing aircraft are used by the military services to perform numerous utility tasks. The character of the noise encountered within the utility-type aircraft is described and illustrated. Noise envelopes are depicted for 14 aircraft powered by small reciprocating engines rated at less than 600 horsepower, 9 powered by reciprocating engines rated

at 1200 to 1525 horsepower, and 8 powered by turboprop engines. In addition to general noise profiles representative of normal cruise, levels are shown for other phases of operation. The noise encountered within utility aircraft constitutes a significant auditory risk since personal ear protection (including headsets mounted in crash helmets) is not routinely worn in most of these aircraft. Author (GRA)

N72-32053# Boeing Co., Philadelphia, Pa. Vertol Div.
HELICOPTER DEVELOPMENT RELIABILITY TEST REQUIREMENTS. VOLUME 2: STUDY PARAMETERS INTERRELATIONSHIP Final Report
R. B. Aronson Ft. Eustis, Va. Army Air Mobility Res. and Develop. Lab. Feb. 1972 28 p
(Contract DAAJ02-70-C-0039; DA Proj. 1F1-62203-A-143)
(AD-741377; D210-10207-2; USAAMRDL-TR-71-18B) Avail: NTIS CSCL 01/3

Two of the key activities in programs to develop higher levels of helicopter equipment reliability are test activities: reliability problem-identification testing and reliability demonstration testing. This document introduces the variables that must be dealt with in testing: demonstrated mean time between failures (MTBF), desired level of confidence, demonstration duration, and probability of passing. It also explains their relationships and the testing strategy which derives from the fact that helicopter hardware must have a real MTBF greater than demonstrated MTBF in order to have a reasonable probability of passing a prescribed demonstration. GRA

N72-32054# Boeing Co., Philadelphia, Pa. Vertol Div.
HELICOPTER DEVELOPMENT RELIABILITY TEST REQUIREMENTS. VOLUME 3: SENSITIVITY ANALYSIS Final Report
Robert H. Jines Ft. Eustis, Va. Army Air Mobility Res. and Develop. Lab. Feb. 1972 78 p
(Contract DAAJ02-70-C-0039; DA Proj. 1F1-62203-A-143)
(AD-742247; D210-10207-3; USAAMRDL-TR-71-18C) Avail: NTIS CSCL 14/2

Variables used in Volume I, Study Results, which are of the type heavily influenced by management philosophy, available resources, etc., are investigated for their effect on problem identification test costs. Cost optimizations of bench test versus flight test were performed at 126 data points. In particular, the variables studied are: MTBR off-the-board, corrective action efficiency, test effectiveness, and test operating time/calendar time. MTBR off-the-board and corrective action efficiency are identified as the variables which can heavily influence the problem identification test costs. Author (GRA)

N72-32055# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BASIC PROBLEMS IN PRODUCING LAMINATED AIRCRAFT STRUCTURES
H. Oltarzewski 11 Apr. 1972 14 p Transl. into ENGLISH from Tech. Lotnicza Astronautyczna (Poland), v. 26, no. 3, 1971 p 16-18
(AD-742780; FTD-HC-23-191-72) Avail: NTIS CSCL 11/4

The article gives a short description of technology and production of laminates. In it, attention was drawn to the difficulties encountered by introducing laminates into production of aircraft structures, which stems from a certain way of thinking, usages, and customs connected with producing traditional structures. Reasons for the stagnation in national planning were given. Author (GRA)

N72-32056# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
STATIC AND DROP TESTS OF A QUARTER SCALE MODEL OF THE CC-115 AIRCRAFT EQUIPPED WITH AN AIR CUSHION LANDING SYSTEM
John C. Vaughn, III, Shade Campbell, and David J. Pool Jan. 1972 44 p refs
(AD-743829; AFFDL-TM-72-01-FEM) Avail: NTIS CSCL 01/3

Static load deflection tests and vertical drop tests were performed on a quarter scale model of a Canadian CC-115 (Buffalo) aircraft equipped with an Air Cushion Landing System (ACLS). The model weighed 610 lbs and the ACLS air supply was furnished by two electric fans. The static load deflection tests showed that the model weight could be increased from 610 lbs to 1310 lbs before the fans stalled. The model deflection one inch when 560 lbs were added to it during hover over a solid surface. The portion of the weight supported by the trunk (instead of the cushion) increased from 3% at 610 lbs to 24% at 1310 lbs. Author (GRA)

N72-32057# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MICROWAVE ILS SCANNING BEAM DATA RATE ANALYSIS APPLIED TO THE CH-53A HELICOPTER M.S. Thesis
Paul R. Stolz Apr. 1972 96 p refs
(AD-743612; GSA/MA/71-18) Avail: NTIS CSCL 01/2

Data rate requirements for low visibility approach with a sample data measurement of glideslope deviation was investigated analytically using CH-53A helicopter dynamics. A window was defined by specifying certain allowable deviations in the aircraft motion variables which are acceptable for continuation of the landing at a 100 ft decision altitude. The approach performance was defined as the probability of missing the window, which corresponds to the probability of a missed approach. The landing approach process was modeled by a system of stochastic differential equations which account for the aircraft dynamics, atmospheric disturbances, guidance errors and data rate. The flight control system was modeled by a state estimator and a state feedback matrix which was optimized so as to minimize the probability of a missed approach subject to rms constraints on control activity. Author (GRA)

N72-32058# Lockheed-Georgia Co., Marietta.
ANNEALED FOIL FATIGUE SENSOR DEVELOPMENT Final Report, Dec. 1967 - May 1971
Robert S. Horne and Oscar L. Freyre Mar. 1972 231 p refs
(Contract F33615-68-C-1221; AF Proj. 3170)
(AD-743968; LGR-ER-11411; AFFDL-TR-71-127) Avail: NTIS CSCL 14/2

The development testing of the C-5A full-scale fatigue specimens presented a timely opportunity to continue the development of a system of fatigue sensing devices. The fatigue sensor selected for use was previously evaluated during an Air Force funded feasibility study and has been adapted to meet the application requirements on full-scale C-5A structure. The report constitutes the final report regarding this effort and applies specifically to an evaluation of the sensor on the C-5A laboratory fatigue test specimens. The techniques of sensor installation, location, data acquisition methods, and analysis of sensor response are herein evaluated in view of potential utilization on fleet aircraft. Author (GRA)

N72-32059# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
EVOLUTION AND DESCRIPTION OF THE TRACERS GROUND TO AIR ESCAPE/RESCUE SYSTEM Final Report
C. R. Lampart and J. L. Kaminski 21 Apr. 1972 175 p refs
(AD-743477; NADC-72043-VT) Avail: NTIS CSCL 06/7

A study was conducted to determine a workable configuration for a Ground-to-Air Escape/Rescue System called TRACERS. The study showed that a low-cost, self-rescue aircraft, capable of vertical take-off and 75-nautical mile cruise is feasible. Author (GRA)

N72-32060# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
TEST PLAN REPORT FOR ARRESTED LANDING FATIGUE TEST OF MODEL E-2 A/B AIRPLANE

Edward F. Kautz 1 May 1972 18 p ref
(AD-743478; NADC-72047-VT) Avail: NTIS CSCL 01/3

A laboratory fatigue test will be performed on an E-2 airframe to determine whether the airframe will sustain the effects of 3000 arrested landings without structural failure. Author (GRA)

N72-32061# Naval Aerospace Medical Research Lab., Pensacola, Fla.

ORIENTATION-ERROR ACCIDENTS IN REGULAR ARMY AIRCRAFT DURING FISCAL YEAR 1969: RELATIVE INCIDENCE AND COST

W. Carroll Hixson, Jorma I. Niven, and Emil Spezia 7 Apr. 1972 45 p refs
(MF12524005)
(AD-743483; NAMRL-1161; USAARL-72-13) Avail: NTIS CSCL 01/2

The report is the third in a longitudinal series of reports dealing with the pilot disorientation/vertigo accident problem in Army fixed wing and rotary wing flight operations. Incidence and cost data presented for fiscal year 1969 include a total of 71 major and minor orientation-error accidents (22 of which were fatal), resulting in 51 fatalities, 79 nonfatal injuries, and an over-all aircraft damage cost of $11,928,660. The contribution of rotary wing accidents to these totals was 65 accidents (20 of which were fatal), resulting in 46 fatalities, 78 nonfatal injuries, and $11,724,852 aircraft damage. Author (GRA)

N72-32062# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DEVELOPMENT OF METHODS AND MEANS FOR STUDYING THE ACCUMULATION OF FATIGUE DAMAGE IN AIRCRAFT STRUCTURES

I. G. Kolker 6 Apr. 1972 12 p Transl. into ENGLISH from Tr. Elektrotekhn. Inst. (Novosibirsk), 1967 p 223-230
(AF Proj. 1347)
(AD-744280; FTD-MT-24-1454-71) Avail: NTIS CSCL 01/3

Inertial force-loading apparatus for simultaneous endurance testing of a large number of specimens and structural elements under simple, compound, and variable loading is described. The apparatus, developed for designing airframes, employs a biharmonic vibroplatform with a program mechanism for varying vibration amplitude and frequency and a four-rail trolley. The accumulation of fatigue damage is determined by statistical indicators. The indicators are calibrated under laboratory and flight conditions. When installed on aircraft, they make it possible to establish statistical equivalents between the damage of indicator specimens and the airframe elements of the aircraft being tested. Author (GRA)

N72-32063# Minnesota Univ., Minneapolis.

STUDY OF PARACHUTE FORCES AND CANOPY PRESSURE DISTRIBUTION MEASURED IN A SUBSONIC WIND TUNNEL UNDER INFINITE MASS CONDITIONS Final Report, 1 Aug. 1969 - 15 Aug. 1971

Helmut G. Heinrich and D. P. Saari Wright-Patterson AFB, Ohio AFFDL Mar. 1972 243 p refs
(Contract F33615-68-C-1227; AF Proj. 6065)
(AD-744103; AFFDL-TR-71-175) Avail: NTIS CSCL 01/3

For the purpose of parachute canopy stress analysis during the period of inflation, the pressure distribution measured on a ring-slot parachute model is related to the instantaneous parachute force. The correlation of pressure and force data is based on test results established at the Deutsche Forschungsanstalt fuer Luft-und Raumfahrt (DFLR), Braunschweig, Germany. The final pressure-force-time relationship incorporate individual as well as averaged test data. A fair agreement could be shown between measured forces and those obtained from numerical integration of differential pressure over the canopy surface. Author (GRA)

N72-32064# Systems Control, Inc., Palo Alto, Calif.

DUAL CONTROL AND IDENTIFICATION METHODS FOR AVIONIC SYSTEMS. PART 1: DUAL CONTROL Final Report

Edison T. S. Tse, Anthony J. Tether, Yaakov Bar-Shalom, and Lewis Meier May 1972 98 p refs
(Contract F44620-71-C-0077; AF Proj. 9769; SCI Proj. 5971)
(AD-744115; AFOSR-72-1186TR-Pt-1) Avail: NTIS CSCL 12/1

The report constitutes Part I of a one-year study on the dual control method for nonlinear systems. The difficulties associated with the general stochastic control problem are discussed, and a new approach to the problem is developed using the concepts of dual control and the principle of optimality from dynamic programming. An adaptive dual control strategy is derived which has the characteristic of actively regulating learning which achieves the control objective. The theoretical development is specialized to a class of problems of controlling a time-varying linear system with random parameters. A specific algorithm is derived for this class of problems, and example problems are presented to demonstrate the computational feasibility of the new algorithm, the performance level of the new algorithm, and to give insight into the present theory. Finally, several areas of applications for the present results are outlined, and abstracts of technical papers supported by this contract are given. Author (GRA)

N72-32065# Systems Control, Inc., Palo Alto, Calif.

DUAL CONTROL AND IDENTIFICATION METHODS FOR AVIONIC SYSTEMS. PART 2: OPTIMAL INPUTS FOR LINEAR SYSTEM IDENTIFICATION Final Report

Raman K. Mehra, Raman K. Stepner, James S. Tyler, Jr., and John A. Casti May 1972 80 p refs
(Contract F44620-71-C-0077; AF Proj. 9769; SCI Proj. 5971)
(AD-744116; AFOSR-72-1187TR-Pt-2) Avail: NTIS CSCL 12/1

The report presents the results of the second part of a one-year study on Dual Control and Identification Methods for Avionic Systems. First, a general theory is developed for designing optimal inputs to identify parameters in linear dynamic systems. It is shown that the optimal energy constrained input maximizing a weighted trace of the Fisher information matrix is an eigenfunction of a positive self-adjoint operator corresponding to its largest eigenvalue. Several numerical algorithms are described for computing the optimal inputs. A computer program based on the Riccati Equation algorithm is developed and used for computing optimal elevator deflection time histories to identify the short period stability and control derivatives of C-8 aircraft. Author (GRA)

N72-32066# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

A STUDY OF THE EFFECTS OF PARAMETER VARIATION ON THE FLYING QUALITIES OF THE XV-4B V/STOL AIRCRAFT Technical Report, Oct. 1967 - Oct. 1969

Arthur G. Jones Mar. 1972 136 p refs
(AF Proj. 8219)
(AD-744104; AFFDL-TR-72-44) Avail: NTIS CSCL 01/3

The dominating influence of the propulsion system on the dynamic motion of a V/STOL aircraft operating in the hover or low-velocity flight modes has greatly increased the difficulty of developing such an aircraft to be stable and controllable during these modes. Small variations in stability derivatives caused by either changes in the propulsive system or errors in measurement or analytical prediction programs have been shown to cause significant changes in the dynamic characteristics of such aircraft. To better understand relationships, a program was performed using the Lockheed XV-4B jet-lift aircraft as a subject configuration. During this program, the magnitudes of ten of the stability derivatives used to describe the aircraft were varied individually, and the change in the roots of the linearized, uncoupled equations of motion noted. Author (GRA)

N72-32067# Massachusetts Inst. of Tech., Cambridge Aeroelastic and Structures Research Lab.

STATIC AND DYNAMIC NONLINEAR STRUCTURAL

PROBLEMS Final Rept.
T. H. H. Pian and Pin Tong Mar. 1972 13 p refs
(F44620-67-C-0019; AF Proj. 9782)
(AD-744114; ASRL-TR-144-6; AFOSR-72-0808TR) Avail: NTIS CSCL 01/3

The objective of this research is to develop mathematical tools for determining stresses, deformation, and stability of aerospace vehicle structures. The nonlinear structural behavior, such as geometrical nonlinearity due to large deflection and the material nonlinearity due to post-yielding and time-dependent behavior of the material, is included in the investigation.
Author (GRA)

N72-32068# Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
DESIGN METHOD FOR FULLY AUGMENTED SYSTEMS FOR VARIABLE FLIGHT CONDITIONS Final Technical Report, 5 Oct. 1970 - 5 Sep. 1971
Albert J. VanDierendonck Wright-Patterson AFB, Ohio AFFDL Jan. 1972 300 p refs
(Contract F33615-71-C-1058; AF Proj. 8219)
(AD-744491; F0042FR; AFFDL-TR-71-152) Avail: NTIS CSCL 01/3

A practical controller design procedure for aircraft for their entire flight envelope is developed based on quadratic optimal control technology. The resulting design is an optimal gain schedule with some gains fixed and some gains variable. The procedure is applied to two example aircraft, the F4 Lateral-Direction Axes and the YF-12 Pitch Axis. Good handling qualities are a criteria for both examples. An additional criterion of minimizing accelerations due to flexure is included in the YF-12 design. The handling-quality criteria are expressed as model-following errors while the ride qualities are expressed as mean square accelerations. A computer algorithm is developed to solve this fixed-plus-variable-gain optimization problem with measurement realizability constraints. The algorithm successfully handled 11 flight conditions and 22nd-order dynamics over four flight conditions. A pole-placement algorithm is also extended to multiple flight conditions but is not applied. Author (GRA)

N72-32069# Owens-Illinois, Inc., Toledo, Ohio. Administrative Div.
PLASMA DISPLAY TERMINAL Final Report, 18 May - 18 Dec. 1971
Leonard J. Roth Griffiss AFB, N. Y. RADC May 1972 124 p refs
(Contract F30602-71-C-0272)
(AD-744096; RADC-TR-72-113) Avail: NTIS CSCL 09/5

The report contains the results of a study and test program to determine the feasibility of using an Owens-Illinois, Inc. DIGIVUE model 512/60 (sixty element per linear inch) plasma display/memory device in military airborne environments. The study used MIL-E-5400L, Class 1A as a baseline. Five panels were tested to the following MIL-STD-810B environments: Altitude: Method 500, Procedure 1; High Temperature: Method 501, Procedure II, 2 cycles only; Low Temperature: Method 502; Temperature Shock: Method 503, Step 1-5, 8-10; Temperature-Humidity-Altitude: Method 518 (Modified), one cycle only and limited to the following thermal conditions: Operating -25 C to -55 C, Non-Operating -62 C to -85 C. GRA

03 AUXILIARY SYSTEMS

Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines, hydraulic, pneumatic and electrical systems; actuators, and inverters. For related information see also: 09 Electronic Equipment; 22 Nuclear Engineering; and 28 Propulsion Systems.

N72-32070*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEVELOPMENT, DESIGN AND TEST OF A 66 W/kg (30-W/lb) ROLL-UP SOLAR ARRAY
W. A. Hasbach and R. G. Ross, Jr. 15 Sep. 1972 38 p refs
(Contract NAS7-100)
(NASA-CR-128196; JPL-TR-32-1562) Avail: NTIS HC $4.00 CSCL 10A

A program to develop a 250 square foot roll-up solar array with a power-to-weight ratio exceeding 30 watts per pound is described. The system design and fabrication of a full scale engineering development model are discussed. The system and development test program results are presented. Special test equipment and test procedures are included, together with comparisons of experimental and analytical results. Author

N72-32071*# Gulton Industries, Inc., Metuchen, N.J.
ONE HUNDRED AMPERE-HOUR NICKEL-CADMIUM BATTERY CELLS OF IMPROVED DESIGN
Edward Kantner [1972] 58 p
(Contract NAS1-8151)
(NASA-CR-112139) Avail: NTIS HC $5.00 CSCL 10C

Nickel cadmium battery cells with 100 ampere hour capacity were developed. The design features, notably extension of the current collector tab to the full width of the battery plate, and the location of the cell terminals on the opposite ends, resulted in a reduction of internal impedance, and improved electrical performance with expected improvement in thermal performance. Tables of data and performance curves are included to support the theoretical considerations. Author

N72-32072*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN AND COLD-AIR INVESTIGATION OF A TURBINE FOR A SMALL LOW-COST TURBOFAN ENGINE
Milton G. Kofskey and William J. Nusbaum Washington Sep. 1972 33 p refs
(NASA-TN-D-6967; E-6850) Avail: NTIS HC $3.00 CSCL 10A

An 8.00-in mean diameter two-stage turbine was investigated over a range of speeds from 0 to 110 percent of equivalent design speed and over a range of pressure ratios from 1.79 to 5.14. Presented are design information and turbine performance for first-stage and two-stage operation. Results are presented in terms of equivalent specific work, torque, mass flow, rotor exit flow angle, and efficiency. Author

N72-32073*# National Aeronautics and Space Administration, Washington, D.C.
FOR THE STUDY OF NICKEL HYDROXIDE ELECTRODES. 1: THROUGH NICKEL (2) HYDROXIDE HYDRATE
H. Bode, K. Dehmelt, and J. Witte Jun. 1972 19 p refs Transl. into ENGLISH from Electrochim. Acta (Oxford), v. 11, no. 8, Aug. 1966 p 1079-1087 (German Language Doc.)
(NASA-TT-F-14449) Avail: NTIS HC $3.00 CSCL 10C

Experimental results leading to a better understanding of reactions and reaction products on the nickel oxide electrode of the alkaline storage battery are reported. A hitherto unknown hydroxide of bivalent nickel is reported which is genetically similar to the oxidation products found on a charged nickel oxide electrode. Author

N72-32074*# Agnew Tech-Tran, Woodland Hills, Calif.
POSSIBILITY OF USING AN ATMOSPHERE BASED ON CO2 IN A POWER PLANT
U. Ghezzi and L. DeLuca Washington NASA Jun. 1972 17 p refs Transl. into ENGLISH from L'Evoluzione della Propulsione Spaziale negli Anni 1970 Presented at the 10th Intern. Tech. and Scientific Conf. on Space (Rome), 9-11 Mar. 1970 p 151, 153-164 Sponsored by NASA
(NASA-TT-F-14505) Avail: NTIS HC $3.00 CSCL 10A

The operation of a power plant on a planet utilizing the atmosphere as a working fluid is considered along with the

power plant operating completely independent of its environment. It is assumed that a gas turbine using hydrogen as a fuel and oxygen for combustion is the power plant. Three cases are examined: (1) The working fluid is composed only of products from the combustion reaction between oxygen and hydrogen without using the external atmosphere. (2) The reaction products are used for heating the atmospheric fluid by using a heat exchanger. (3) The atmospheric fluid is involved directly in the combustion reaction between hydrogen and oxygen. A comparison of the three cases is made to define the most convenient system for given working conditions, and required services. F.O.S.

N72-32075*# Translation Consultants, Ltd., Arlington, Va.
THE p-TYPE-GaAs(1-x)Px) n-TYPE-GaAs HETEROJUNCTION SOLAR CELLS
A. G. Cheban, V. V. Negreskul, P. T. Oush, L. V. Gorchak, G. I. Unguryanu, and V. G. Smirnov Washington NASA Sep. 1972 7 p refs Transl. into ENGLISH from Geliotekh. (USSR), v. 27, no. 1, 1972 p 30-33
(Contract NASw-2038)
(NASA-TT-F-14592) Avail: NTIS HC $3.00 CSCL 10A

Measured dark current-voltage characteristics, light current-voltage characteristics under load, and spectral response curves are given for photosensitive elements prepared by liquid epitaxial growth of p-type GaAs sub 1-x P sub x on an n-type GaAs substrate. Due to the absence of a conditioning surface layer, 30% of the radiation incident on the working surface is reflected, yielding an efficiency of 6 to 7%. Recommendations are given for improvement in this area. Author

N72-32076# Atomic Energy Centre, Lahore (Pakistan).
RECHARGABLE BATTERIES: A SELECT BIBLIOGRAPHY
M. Saleem Oct. 1971 318 p refs
(AECL-PAK/Lib-34) Avail: AEC Depository Libraries

A bibliography is presented of 651 abstracts of articles published between 1954 and 1970 on rechargable batteries for use in aerospace technology. The abstracts are arranged in chronological order by publication date within each of the following categories: nickel-cadmium batteries, silver-cadmium batteries, silver-zinc batteries, alkaline batteries, storage batteries, and electrodes. An author index is included. NSA

N72-32077# Colorado Univ., Boulder. Dept. of Electrical Engineering.
SYNTHESIS OF HIGH SPEED HOMOPOLAR ALTERNATORS AND THEORY OF SOLID ROTOR ELECTRICAL MACHINES, PART 5, PHASE DD Final Report
Edward A. Erdelyi, Milan Siegl, Salem G. Mouzughi, and David A. Remington Mar. 1972 69 p refs
(Contract DA-44-009-AMC-787(T))
(AD-743591) Avail: NTIS CSCL 10/2

The experimental procedures described in the report are in reality of two different kinds, though both can be characterized as magnetic measurement. The report has been subdivided into two parts: A and B. Part A deals with measurement techniques of iron losses in premagnetized, alloyed magnetic laminations between 60 and 3,600 Hz. Part B deals with the measurement of radial airgap inductions in rotating electrical machines. GRA

N72-32078# Whiteley Industries, Inc., Wilmington, Mass.
POWER GENERATING SUBCOMPONENT/FUEL CELL MODULE Final Report, Feb. 1970 - Dec. 1971
R. E. Salathe and R. J. Dumas May 1972 84 p refs
(Contract DAAB07-70-C-0136)
(AD-744477; ECOM-0136-F) Avail: NTIS CSCL 10/2

A hydrazine air fuel cell power generating module capable of 120 watts continuous output was designed, constructed, evaluated. The fuel cell module incorporated design features permitting low cost manufacturing techniques to be used. This approach permits the economic use of the desirable characteristics of a fuel cell power module with the life attainable commensurate with the present state of the art. A fuel cell module from the units delivered was selected at random and subjected to an evaluation test program. The report describes the original design as represented by the Design Plan, the Final Design incorporated in the delivered hardware, and the Evaluation Testing Conducted to assure compliance with the contract technical requirements. Author (GRA)

N72-32079# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HIGH TEMPERATURE IMPREGNATION OF SINTERED METAL BASES OF ALKALINE BATTERY ELECTRODES
Yu. N. Petvushin and M. F. Skalozubov 24 Mar. 1972 9 p refs Transl. into ENGLISH from Issled. v Obl. Prikl. Elektrokhimii (USSR), v. 190, 1969 p 96-100
(AD-744254; FTD-HC-23-1813-71) Avail: NTIS CSCL 10/3

The proposed method of high temperature impregnation of sintered metal bases under excessive steam pressure eliminates the negative factors of impregnation in highly concentrated solutions. The authors investigate the possibility of using high temperature impregnation of sintered metal bases in highly concentrated given solutions for the purpose of intensifying the process of filling the pores with an active mass. Author (GRA)

04 BIOSCIENCES

Includes aerospace medicine, exobiology, radiation effects on biological systems; physiological and psychological factors. For related information see also: 05 Biotechnology.

N72-32080*+ National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 104, JULY 1972
Jul. 1972 134 p refs
(NASA-SP-7011(104)) Avail: NTIS HC $3.00 CSCL 06E

This special bibliography lists 409 reports, articles, and other documents introduced into the NASA scientific and technical information system in June 1972. Author

N72-32081*# California Univ., San Diego. Dept. of Neurosciences.
ELECTROPHYSIOLOGICAL STUDIES OF THE NERVOUS SYSTEM Final Report, Jan. 1970 - May 1972
Robert Galambos 21 Jul. 1972 10 p refs
(Grant NGR-05-009-083)
(NASA-CR-128249) Avail: NTIS HC $3.00 CSCL 06P

The electrophysiology of the nervous system is studied using cats and human subjects. Data cover effects of chlorolose on evoked potential, the evoked resistance shift that accompanies evoked potentials, and the relationship of eye movements to potentials aroused by visual stimulation. Author

N72-32082*# Maryland Univ., College Park. Dept. of Botany.
A STUDY OF PHYCOPHYSIOLOGY IN CONTROLLED ENVIRONMENTS
Robert W. Krauss 15 Jun. 1971 67 p refs
(Grant NGR-21-002-003)
(NASA-CR-128296; SASR-22; TR-1022) Avail: NTIS HC $5.50 CSCL 06P

The primary objective of this research is to obtain fundamental data concerning the growth and metabolism of the unicellular green algae. These organisms are most likely to provide biological oxygen and a food source for space crews. Biochemical conversions, chemical composition, and cell growth and division are discussed. Chlorella sorokiniana is emphasized. J.A.M.

N72-32083*# Colorado State Univ., Fort Collins.
RARE-GAS EFFECTS ON METABOLISM AND INERT GAS NARCOSIS Semiannual Status Report
30 Apr. 1972 83 p refs
(Grant NGR-06-002-075)
(NASA-CR-128213) Avail: NTIS HC $6.25 CSCL 06P

The detailed examination is reported of the theory that narcosis results from expansion of the cell membrane under high partial pressures. The research is partially based on the hypothesis that, like oxygen toxicity, the mechanism of metabolic effects of rare gases may be similar at both low and high pressures and are simply more observable at high pressures. Using adult female goats, the parameters measured include oxygen consumption, CO2 production, respiration rate, heart rate, rectal and skin temperatures and the analysis of electroencephalograms and evoked response. Additionally, the specific activity is measured of plasma glucose subsequent to injection of glucose-UL-C-14, intravenous infusion, specific activity of expired CO2, unesterified fatty acid levels and whole blood lactate-to-pyruvate ratios. Also studied were the effects of acetylsalicylic acid, vitamin E and cationic detergents (which alleviate narcosis) upon metabolic changes induced by high pressure narcosis. Author

N72-32084# Joint Publications Research Service, Arlington, Va.
SPATIAL ORIENTATION OF BATS UNDER THE INFLUENCE OF INCREASED GRAVITY
E. Sh. Ayrapetyants, V. N. Zvorykin, and B. M. Savin 23 May 1972 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), no. 3, 1972 p 723-725
(JPRS-56073) Avail: NTIS HC $3.00

An examination of bat orientation in space by echolocation is presented. Data cover spatial analysis in echolocating animals after sharp functional changes in their acceleration system resulting from exposure to increased gravity. The study shows that severe functional changes in the acceleration system lead to impairment of the mechanism of echolocation, suggesting that there are definite functional interrelations between these systems which apparently play a major role in spatial analysis. Author

N72-32085*# Translation Consultants, Ltd., Arlington, Va.
PHYSIOLOGICAL CHANGES DURING PROLONGED BED REST
K. Rodahl, N. C. Birkhead, J. J. Blizzard, B. Issekutz, Jr., and E. D. R. Pruett Washington NASA Aug. 1972 8 p refs Transl. into ENGLISH from Nord. Med. (Stockholm), v. 75, no. 7, Feb. 1966 p 182-186
(Contract NASw-2038)
(NASA-TT-F-14342) Avail: NTIS HC $3.00 CSCL 06P

Effects of prolonged bed rest on physical work capacity, tilt-table tolerance, and urinary calcium excretion were studied. It was concluded that reduced physical work capacity is caused by the inactivity associated with prolonged bed rest; impaired tilt-table tolerance is due to the absence of the necessary cardiodynamic stress required for the maintenance of the cardiovascular regulatory mechanism, and increased urinary calcium excretion is due to the absence of the normal longitudinal pressure in the long bones. Author

N72-32086*# Scientific Translation Service, Santa Barbara, Calif.
PROBLEMS OF HEAT STERILIZATION DYNAMICS
S. Komemushi Washington NASA Aug. 1972 30 p refs Transl. into ENGLISH from Hakko Kogaku Zasshi (Osaka), v. 49, no. 8, Aug. 1971 p 706-715
(Contract NASw-2035)
(NASA-TT-F-14543) Avail: NTIS HC $3.50 CSCL 06M

Death behavior of microorganisms during heat sterilization is studied in connection with conformity or nonconformity to the logarithmic death law. Various interpretations of the dynamics of the logarithmic death law are cited from the literature, and possible explanations for nonlogarithmic death curves are advanced. The role of thermal activation phenomena in heat sterilization is discussed. Author

N72-32087*# Scientific Translation Service, Santa Barbara, Calif.
THE TERMINAL DECONTAMINATION OF ROOMS. EVALUATION OF EFFICACITY CHECK
G. Reybrouck and H. VandeVoorde Washington NASA Aug. 1972 20 p refs Transl. into ENGLISH from Prod. Pharm. (Paris), v. 27, 1972 p 199-206
(Contract NASw-2035)
(NASA-TT-F-14544) Avail: NTIS HC $3.00 CSCL 06M

The various methods successively applied to check the efficacity of the terminal decontamination of rooms by means of gaseous formaldehyde are described. All the contaminated carriers were exposed to the action of the formaldehyde vapor in the test room. Although a high level of formaldehyde in the air was measured, not all the carriers inoculated by a high inoculum of bacteria were sterilized. The causes of the failure are discussed, and recommendations for further investigations are formulated. Author

N72-32088*# Techtran Corp., Glen Burnie, Md.
PROLONGED ACTION OF MEDIUM INTENSITY NOISE ON THE FUNCTIONAL CONDITION OF AN ORGANISM
O. P. Kozerenko, E. I. Matsnev, V. I. Myasnikov, and I. Ya. Yakovleva Washington NASA Sep. 1972 18 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, Jul.-Aug. 1967 p 527-535
(Contract NASw-2037)
(NASA-TT-F-14567) Avail: NTIS HC $3.00 CSCL 06S

Experiments involving exposure to a wideband sonic background were conducted in an isolation chamber. Reactions to this exposure included fatigue, physical illness, irritability and cases of increased work ability. Author

N72-32089*# National Aeronautics and Space Administration, Washington, D.C.
QUESTION OF THE DAILY PERIODICAL HEARING IN A PERIOD IN CONDITIONS OF EXPOSURE TO PROLONGED NOISE
Yu. V. Krylov Sep. 1972 5 p refs Transl. into ENGLISH from the publ. "Aviakosmicheskaya Meditsina" Moscow, 1967 p 170-173
(NASA-TT-F-14568) Avail: NTIS HC $3.00 CSCL 06S

A description is given of experiments which reflect deviations in the hearability threshold of ±4 to 5 db in the absence of noise and up to ±17 db with various forms of noise. Author

N72-32090*# Translation Consultants, Ltd., Arlington, Va.
THE QUESTION OF THE EFFECT OF CUMULATIVE VERTICAL VIBRATION AND NOISE ON A SERIES OF PROTEIN, FAT, AND CARBOHYDRATE METABOLISM INDICES FOR WARM-BLOODED ANIMALS
G. I. Bondarev, Ye. N. Aronova, D. A. Mikelson, and L. Ya. Skuratova Washington NASA Sep. 1972 5 p Transl. into ENGLISH from Gigena Truda i Prof. Zabolevaniya (Moscow), no. 10 Oct. 1968 p 58-59
(Contract NASw-2038)
(NASA-TT-F-14569) Avail: NTIS HC $3.00 CSCL 06C

The results of an investigation of the effect of vibration and noise, resembling that found aboard ships, on protein, fat, and carbohydrate metabolism indices in animals are discussed. Author

N72-32091*# Translation Consultants, Ltd., Arlington, Va.
INVESTIGATION OF THE INTERRELATIONSHIP BETWEEN THE BRAIN'S BIOELECTRIC AND ITS OXYGEN DEMAND UNDER VIBRATION EFFECTS
L. D. Lukyanova and Ye. P. Kazanskaya Washington NASA Sep. 1972 12 p refs Transl. into ENGLISH from Fiziologicheskiy Zh. (USSR), v. 53, no. 5, May 1967 p 563-570
(Contract NASw-2038)
(NASA-TT-F-14570) Avail: NTIS HC $3.00 CSCL 06P

The correlation between changes in bioelectric activity in

superior portions of the cerebrum and their oxidizing metabolisms is analyzed. Author

N72-32092# Royal Aircraft Establishment, Farnborough (England).
CHANGES IN THE PULSE FREQUENCY RHYTHM IN RELATION TO THE WORKLOAD
W. Laurig and U. Philipp Aug. 1972 19 p refs Transl. into ENGLISH from Arbeitsmed., Sozialmed., Arbeitshygiene (Leipzig), v. 5, 1970 p 184-188
(RAE-Lib-Trans-1586) Avail: NTIS HC $3.00

Starting with a phenomenonological description of the heart rate rhythm, an arrhythmia condition was derived theoretically. Experimental results from physical and mental work gave values for the average behavior of the arrhythmia quotient in relation to the intensity of the work of a large collection of male subjects. A regression calculation over the individual results of all the experiments shows a reduction in the arrhythmia quotient with the workload. A control theory description is used for the behavior of the arrhythmia on rest. The significance of heart rate measurements in medical practice was discussed. Author

N72-32093# Royal Aircraft Establishment, Farnborough (England).
CIRCADIAN VARIATIONS IN CHOICE REACTION TIME
Ernst Poeppel and Juergen C. Aschoff Aug. 1972 19 p refs Transl. into ENGLISH from Z. Exp. Angew. Psychol. (W. Germany), v. 17, no. 4, 1970 p 537-552
(RAE-Lib-Trans-1668; BR-31284) Avail: NTIS HC $3.00

Four different experiments were performed to test how daily variations of reaction time to optical and acoustic stimuli are influenced if the natural rhythm of sleep and waking is disturbed. The amplitude of circadian variations is greatest if subjects are allowed to sleep during the experimental night and woken for experimental runs. Staying awake at night causes a decrease in the circadian amplitude. The motivation of the subjects and the repetition of experimental runs are important factors which have to be controlled in studies on circadian variations of psychological functions. Author

N72-32094*# Scientific Translation Service, Santa Barbara, Calif.
VIBRATION AS A FACTOR IN INCREASING THE EFFECT OF NOISE
P. S. Kublanova Washington NASA Sep. 1972 7 p Transl. into ENGLISH from Vopr. Kliniki Prof. Zabolevaniy (Moscow), 1969 p 73-77
(Contract NASw-2035)
(NASA-TT-F-14542) Avail: NTIS HC $3.00 CSCL 20A

Osseous conductivity was studied in workers employed under conditions of noise and vibration. It is concluded that hearing should be checked at least once every six months after employment under such conditions. Author

N72-32095*# Scientific Translation Service, Santa Barbara, Calif.
PHARAMACOLOGICAL AND PHYSIOLOGICAL STUDIES ON THE PERSPIRATION CENTERS
Bunichi Hasama Washington NASA Sep. 1972 21 p refs Transl. into ENGLISH from Arch. Exp. Pathol. Pharmakol. (Berlin), v. 153, 1930 p 291-308
(Contract NASw-2035)
(NASA-TT-F-14545) Avail: NTIS HC $3.25 CSCL 06P

Potassium, barium and sodium ions have a temperature-increasing and diaphoretic effect of sympathetic nature on the heat and perspiration center, while magnesium and calcium ions inhibit both centers. The area of the heat and perspiration centers behaves antagonistically to potassium and calcium ions, like the peripheral organs. Magnesium and calcium ions are not antagonistic, but synergistic in their effect on these centers. In central sympathetic excitation, calcium in the centers may be exchanged for potassium ions in the blood, with the reverse action in central sympathetic relaxation. Author

N72-32096*# Scientific Translation Service, Santa Barbara, Calif.
REGULATORY MECHANISMS FOR FATTY ACID BIOSYNTHESIS
S. Numa, Takashi Hashimoto, and Shigetada Nakanishi Washington NASA Sep. 1972 21 p refs Transl. into ENGLISH from Seikagaku (Tokyo), v. 44, no. 4, 25 Apr. 1972 p 137-145
(Contract NASw-2035)
(NASA-TT-F-14549) Avail: NTIS HC $3.25 CSCL 06P

Recent findings are reported concerning the regulatory mechanisms for the quantity and activity of acetyl-CoA carboxylase, which plays the role of the key enzyme in the regulation of fatty acid biosynthesis. When the speed of fatty acid synthesis must be changed immediately, the regulatory mechanism of changing the enzyme quantity will not be quick enough, and it is assumed that regulation is performed by varying the enzyme activity. In long-term regulation of fatty acid synthesis, however, it is assumed that the regulatory mechanism of changing the enzyme quantity also plays a role. Author

N72-32097*# Scientific Translation Service, Santa Barbara, Calif.
TOWARD KNOWLEDGE OF THE EFFECT OF MAGNESIUM ON THE BODY TEMPERATURE
Julius Schuetz Washington NASA Sep. 1972 7 p refs Transl. into ENGLISH from Arch. Exp. Pathol. Pharmakol. (Berlin), v. 79, 1916 p 285-290
(Contract NASw-2035)
(NASA-TT-F-14550) Avail: NTIS HC $3.00 CSCL 06P

The narcotizing action of magnesium on the heat center predominates over the stimulating effect of tetrahydronaphthalene. Author

N72-32098*# Techtran Corp., Glen Burnie, Md.
EFFECT OF CAFFEINE ON ATHLETIC PERFORMANCE
H. Herxheimer Washington NASA Sep. 1972 8 p refs Transl. into ENGLISH from Muench. Med. Wochschr, (Munich), v. 69, 1922 p 1339-1340
(Contract NASw-2037)
(NASA-TT-F-14561) Avail: NTIS HC $3.00 CSCL 06P

Caffeine administered orally (0.25 g) had no conclusively positive or negative effect on athletic performance (100-yard dash). Author

N72-32099*# Techtran Corp., Glen Burnie, Md.
COMPENSATION OF ALCOHOL EFFECTS BY CAFFEINE AND PERVITIN IN A PSYCHOMOTOR PERFORMANCE
J. Rutenfranz and G. Jansen Washington NASA Sep. 1972 28 p refs Transl. into ENGLISH from Int. Z. Angew. Physiol. Einschl. Arbeitphysiol. (Berlin) v. 18, 1959 p 62-81
(Contract NASw-2037)
(NASA-TT-F-14564) Avail: NTIS HC $3.50 CSCL 06P

Performance on the Graf driving machine was used to evaluate the sobering effect of caffeine and pervitin on subjects who had drunk alcohol. Nine mg pervitin per kg of body weight improved psychomotor performance after drinking 1 gram of alcohol/kg of body weight, while 0.2 g caffeine/kg body weight had no such effect. Other disturbed functions remained unaffected by pervitin, however. Author

N72-32100*# Scientific Translation Service, Santa Barbara, Calif.
HUMAN ENDURANCE OF IMPACT ANGULAR ACCELERATIONS
V. M. Tardov Washington NASA Sep. 1972 6 p Transl. into ENGLISH from Aviats. Kosmich. Med. (Moscow), v. 2, 1969 p 244-248 Presented at 30 All-Union Conf. on Aviation and Space Med., Kaluga, 10-13 Jun. 1969
(Contract NASw-2035)
(NASA-TT-F-14565) Avail: NTIS HC $3.00 CSCL 06P

Human resistance to impact angular accelerations under

emergency conditions and the basic rules governing the human response to this type of action are studied. Author

N72-32101*# Scientific Translation Service, Santa Barbara, Calif.
A STUDY ON THE COMPRESSION STRENGTH OF HUMAN VERTEBRAE
S. A. Gozulov, V. A. Korzhen'yants, V. G. Skrupnik, and Yu. N. Sushkov Washington NASA Sep. 1972 11 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. i Embriol. (Moscow), v. 51, no. 9, 1966 p 13-18
(Contract NASw-2035)
(NASA-TT-F-14566) Avail: NTIS HC $3.00 CSCL 06P

The strength of the vertebrae in the age group from 19 to 40 years underwent changes under the rate of loading 10 mm/min, on the average from 400 kg in the cervical region to 1300 kg in the lumbar one. In case of axial loading the sublimbic zone proved to be the weakest part of the vertebra. Deformation of the vertebral bodies by 6 to 10% did not affect elastic properties of the osseous tissue and was not accompanied by macroscopic changes in the structure. Injurious processes develop in a definite sequence, in accordance with magnitude of the applied force and deformation. The strength of the intervertebral discs slightly exceeds that of the vertebrae. The lumbar intervertebral discs showed the greatest power of endurance, while the cervical ones were the weakest. Mechanical characteristics of the vertebrae and of the intervertebral discs vary considerably attaining from 20 to 50% of the mean arithmetical values. Author

N72-32102*# Scientific Translation Service, Santa Barbara, Calif.
HUMAN ENDURANCE OF BRIEF (IMPACT) OVERLOADS (THE PROBLEM OF SELECTING A MECHANICAL MODEL)
G. I. Severin, A. S. Povitskiy, and B. A. Rabinovich Washington NASA Sep. 1972 5 p Transl. into ENGLISH from Aviats. Kosmich. Med. (Moscow), v. 2, 1969 p 202-205
(Contract NASw-2035)
(NASA-TT-F-14571) Avail: NTIS HC $3.00 CSCL 06S

Human endurance of impact overloads was investigated. It was assumed that the endurance limit is determined by mechanical stresses in the human body. Author

N72-32103*# Techtran Corp., Glen Burnie, Md.
INTRAPERITONEAL ADMINISTRATION OF A PHYSIOLOGICAL SOLUTION AS A SUPPLEMENTARY METHOD FOR HYDRATION OF AN ORGANISM
I. V. Anpilogov Washington NASA Sep. 1972 5 p refs Transl. into ENGLISH from Klinich. Med. (Moscow), v. 6, no. 20, 1966 p 142-143
(Contract NASw-2037)
(NASA-TT-F-14574) Avail: NTIS HC $3.00 CSCL 06E

Administration of 2.5 to 3.5 liters of physiological solution into the peritoneal cavity for 40 to 50 minutes was found to be beneficial in correcting excessive water loss in man. Author

N72-32104*# Techtran Corp., Glen Burnie, Md.
ULTRASTRUCTURAL LOCALIZATION OF THE ALKALINE PHOSPHATASE ACTIVITY IN THE INTERRENAL CELLS OF THE TAILED AMPHIBIAN TRITURUS CRISTATUS
J. P. Berchtold and J. S. Hugon Washington NASA Sep. 1972 12 p Transl. into ENGLISH from Histochemie (Berlin), v. 26, 1971 p 258-265
(Contract NASw-2037)
(NASA-TT-F-14577) Avail: NTIS HC $3.00 CSCL 06C

The alkaline phosphatase activity of interrenal (adrenocortical) cells of the tailed amphibian Triturus cristatus is almost exclusively located in the cytoplasmic membranes. This activity is variable from cell to cell, sometimes even missing. All the microvilli of the cellular surface, as well as the pinocytotic vesicles, show alkaline phosphatase activity. The product of the enzymatic reaction is also associated with several short tubules located in the vicinity of the cytoplasmic membrane; these tubules have probably a pinocytotic signification. The product of the enzymatic reaction can also be observed at the periphery of the multivesicular bodies; the origin of alkaline phosphatase activity in these structures is discussed. The other cytoplasmic organelles do not show any activity. The enzymatic reaction, on the other hand, does not take place in cells which have been incubated in a medium without substrate, or preincubated in a solution containing L-cysteine. Author

N72-32105*# Techtran Corp., Glen Burnie, Md.
THE ACTIVITY OF COLLAGENASES AND THE COLLAGEN CONTENT OF THE SKIN DURING CARCINOGENESIS
R. Rohrbach, C. Thomas, R. Ruempler, and M. Lau Washington NASA Sep. 1972 12 p refs Transl. into ENGLISH from Verhandl. Deut. Ges. Pathol. (Stuttgart), v. 54, 1970 p 442-450
(Contract NASw-2037)
(NASA-TT-F-14579) Avail: NTIS HC $3.00 CSCL 06P

During carcinogenesis in the skin of hairless mice the activity of specific collagenases was investigated with the assistance of a synthetic substrate of polypeptides. In carcinogen-treated skin, a remarkable amount of enzyme activity (up to 300% in comparison with the untreated skin), was found. A higher activity was seen in the dermis than in the epidermal layer. In papillomas the enzyme activity was still greater. Highest values were measured from marginal regions of fully developed carcinomas. The total collagen content of the skin was significantly reduced. Higher activity of collagenases has therefore to be considered to lower the total collagen content. Author

N72-32106*# Translation Consultants, Ltd., Arlington, Va.
STUDY OF THE RESISTANCE TO INFECTION OF PREGNANT WOMEN BY THE LYMPHOBLASTIC TRANSFORMATION TEST
P. Morin, D. Alcaly, and J. Choukroun Washington NASA Oct. 1972 6 p refs Transl. into ENGLISH from Gynecol. Obstet. (France), v. 70, no. 1, 1971 p 55-58
(Contract NASw-2038)
(NASA-TT-F-14591) Avail: NTIS HC $3.00 CSCL 06P

Resistance to infection of pregnant women was studied by the lymphoblastic transformation test. The response to PHA is shown to decrease during pregnancy, indicating a relative immunity tolerance during gestation. Author

N72-32107# Joint Publications Research Service, Arlington, Va.
BIOMEDICAL PROBLEMS OF SPACE FLIGHT
Yu. G. Grigoryev, ed., I. M. Khazen, ed., F. P. Kosmolinskiy, ed., V. D. Yablochkin, ed., R. A. Belitskaya, ed., Ye. P. Yevsyukov, ed., and A. I. Ushanov, ed. 28 Oct. 1970 336 p refs Transl. into ENGLISH of "Materialy 3 Nauchnoy Konferentsii Molodykh Spetsialistov" Moscow, USSR Health Min. Inst. of Biomed. Probl., 1969 Conf. held in 1969
(JPRS-51660) Avail: NTIS HC $19.00

Articles on the biomedical problems of space flight are presented. The articles are concerned with the following subjects: (1) biology and microbiology, (2) central nervous system and endocrinal system, (3) cardiovascular system and hematology, (4) physiology of analyzers, (5) metabolism, respiration, and dietary physiology, (6) biochemistry, space pharmacology, and pharmacy, (7) work psychology, hygiene, and toxicology, and (8) radiobiology. Author

N72-32108# Royal Aircraft Establishment, Farnborough (England).
OXYGEN DIFFUSION IN THE BRAIN. PART 2: OXYGEN DIFFUSION WITH O2 DEFICIENCY
K. Diemer Jul. 1972 17 p refs Transl. into ENGLISH from Pfluegers Arch. (Berlin), v. 285, 1965 p 109-118
(RAE-Lib-Trans-1661) Avail: NTIS HC $3.00

On the basis of certain assumptions and calculations, the following points arise: Under normal conditions, the brain works with an excess of oxygen, with an oxygen pressure reserve of

about 9 mmHg. Within this region, the reduction of arterial or venous pO2 leads only to a displacement of the isobars in the tissue. As the result of shifting and regrouping of the areas of tissue supplied by individual capillaries, arising solely from changed conditions of oxygen pressure, slight variations in the pO2 are completely absorbed in the blood. In this way, the tissue pO2 is always maintained at the highest possible level; under normal conditions, the lowest pO2 in the tissue can be as high as the venous pO2, so achieving the maximum value possible. There are basic differences between the effects of arterial and venous hypoxia on the brain. For the same threshold values in the tissue, threshold values of venous pO2 are lower in venous hypoxia than in the case of arterial hypoxia. Changes in the diffusion conditions resulting from the two forms of hypoxia occur in different ways. Author

N72-32109*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF FLYING ON FIBRINOLYTIC ACTIVITY IN THE BLOOD OF JET PILOTS
E. Kuhnke Washington NASA Mar. 1972 17 p refs Transl. into ENGLISH from Wehrdienst und gesundheit., v. 16, 1968 p 1-9 Sponsored by NASA
(NASA-TT-F-14455) Avail: NTIS HC $3.00 CSCL 06S

The effect of stress on fibrinolysis was investigated in pilots being trained in the Starfighter. The physical stresses due to accelerations and emotional stresses during flight are discussed along with the test methods. An average initial value of 192.3 minutes was found for the euglobulin-lysis time, and the average drop was 44 to 56% for the entire flight program. This signifies an important intensification of fibrinolytic activity, as the clot durability is reduced by half. It is recommended that fibrinolysis inhibitors be included with blood supplies for aircraft accidents. F.O.S.

N72-32110*# National Aeronautics and Space Administration, Washington, D.C.
INFLUENCE OF MEDIATION AND THE PRESENCE OF AN OBSERVER ON THE NUMBER OF AGREEMENTS REACHED IN NEGOTIATION
Didier VandenHove Jun. 1972 46 p refs Transl. into ENGLISH from Bull. Centre d'Etudes Rech. Psychotech., v. 19, 1970 p 131-153 Supported in part by Ind.-Univ. Found., by Louvain Univ. Center for Advan. Studies in Business Admin., and by Purdue Univ.
(Grant NSF GS-999)
(NASA-TT-F-14482) Avail: NTIS HC $4.50 CSCL 05A

The effects of three modes of negotiation on the performance of two groups of subjects with different levels of cognitive complexity were studied in a laboratory setting during six consecutive negotiating sessions. The three modes were bilateral, with mediation, and in the presence of an observer. The subjects were observed in two situations varying in the number and quality of logically possible agreement alternatives, or contract zones. With bilateral negotiation, the cognitively complex subjects have better performances than the cognitively simple subjects in the most difficult situation, but they are not as good in the simplest situation. The effect of mediation is weak, slightly improving the performances of the simple subjects. The presence of an observer produces a sharp deterioration in the performances, most pronounced with the complex subjects in the most favorable situation. Overall, it seems that the three negotiating conditions affect the cognitively simple subjects in a more uniform and unequivocal manner than the cognitively complex subjects. Author

N72-32111*# National Aeronautics and Space Administration, Washington, D.C.
WATER-SOLUBLE FILTERS AND THEIR USE IN BACTERIAL COUNTS
K.-H. Maier and K. Voggel Jun. 1972 18 p refs Transl. into ENGLISH from Glas-Instr.-Tech., Fachz. Lab. (Darmstadt, West Ger.), Mar. 1965 p 119-126
(NASA-TT-F-14440) Avail: NTIS HC $3.00 CSCL 06M

A water soluble material suitable for use in making filters to count bacteria suspended in the atmosphere is described. Author

N72-32112*# National Aeronautics and Space Administration, Washington, D.C.
STUDIES OF BACTERIOLOGICAL BIOLUMINESCENCE. ACTION OF MAGNESIUM SALT
Giuseppe Zirpolo Jun. 1972 13 p refs Transl. into ENGLISH from Boll. Soc. di Naturalist (Italy), v. 33, 1920 p 112-119
(NASA-TT-F-14431) Avail: NTIS HC $3.00 CSCL 06M

The action of magnesium sulfates and various other magnesium salts on phosphorescent bacteria is investigated. Attempts were made to determine what proportion of each salt would cause the greatest activity, intensity, and the duration of luminosity. The following results were reported: (1) All magnesium salts with the exception of salicylate caused extraordinary luminous intensity and duration in the bacteria. (2) Magnesium citrate had the least effect on luminescence. (3) Photogenic bacteria thrive in various magnesium salt solutions, but live longer in concentrations up to 11 percent. (4) Magnesium tartrate is most favorable to the development and duration of light in the photogenic bacteria. E.H.W.

N72-32113*# Scientific Translation Service, Santa Barbara, Calif.
PHONOCARDIOGRAM ANALYSIS AND ELECTRONIC COMPUTERS
S. Yoshimura, J. Ozawa, E. Shimoji, A. Zeneomon, T. Suzuki, and T. Nagao Washington NASA Oct. 1972 19 p refs Transl. into ENGLISH from Naika No Ryoiki (Tokyo), v. 20, no. 1, Jul. 1967 p 65-72
(Contract NASw-2035)
(NASA-TT-F-14608) Avail: NTIS HC $3.00 CSCL 06E

A current task in phonocardiography is to develop methods of quantitative analysis so that data can be indicated objectively. Attempts are being made to introduce electronic computers into this field. A hybrid computer system has been in phonocardiogram analysis since 1964. Concrete examples of measurements of 78 phonocardiograms by this system are described, and it is shown that there is good coincidence in 98.9% of the cases analyzed. Author

N72-32114*# Scientific Translation Service, Santa Barbara, Calif.
COMPUTER ANALYSIS OF PHONOCARDIOGRAMS
S. Yoshimura, J. Ozawa, E. Shimoji, Z. Abe, T. Suzuki, and T. Nagao Washington NASA Oct. 1972 19 p refs Transl. into ENGLISH from Saishin Igaju (Japan), v. 22, no. 4, Apr. 1967 p 788-795
(Contract NASw-2035)
(NASA-TT-F-14588) Avail: NTIS HC $3.00 CSCL 06E

Using a hybrid system of computer analysis of phonocardiograms, an attempt was made to diagnose on the level of the clinician of today. The equipment is described, and the measurement and pattern recognition processes are explained. The phonocardiograms of normal individuals and persons suffering from various heart diseases were analyzed by this method. As yet no definite conclusions were reached, although there are fairly good prospects of attaining the goal of perfecting diagnostic equipment on the clinician's level. Author

N72-32115*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Biotechnology and Power Dept.
ANALYSIS OF FUNGAL TYPE ISOLATES TAKEN FROM A 90-DAY MANNED TEST OF AN ADVANCED REGENERATIVE LIFE SUPPORT SYSTEM
M. Sofios and F. E. Swatek (Calif. State Coll., Long Beach) Feb. 1972 35 p
(Contract NAS1-10717)
(NASA-CR-112018; MDC-G2826) Avail: NTIS HC $3.75 CSCL 06M

Fungal-like cultures isolated before, during, and after the 90-day test from samples of space station simulator (SSS) atmosphere, surfaces, subsystem components, and crew dermal sites were identified to genus. Out of the original 525 isolates, approximately 80% were classified as bacteria. Laboratory methods (culture media, moisturization, and incubation temperatures) favored the recovery of medically significant bacteria rather than fungi. Therefore, fungal isolates were mostly, nonfastidious types which are ubiquitous in soil and air and commonly contaminate laboratory cultures of pathogens. Predominant isolates were species of Aspergillus, Penicillium, Pullularia, Rhodotorula, and various yeasts. No instances of fungal proliferation were observed; test data reflect the survival of environmental types indigenous to the SSS pretests. Author

N72-32116*# Translation Consultants, Ltd., Arlington, Va.
DANGERS OF BED REST
J. Schouten and J. Th. R. Schreuder Washington NASA Aug. 1972 13 p refs Transl. into ENGLISH from Ned. Tijdschr. Geneesk. (Haarlem), v. 112, no. 29, Jul. 1968 p 1337-1341
(Contract NASw-2038)
(NASA-TT-F-14349) Avail: NTIS HC $3.00 CSCL 06P

The hazards of bed rest as a therapeutic measure are described with respect to circulatory, respiratory and urogenital tracts. Effects on musculature, joints, skeleton and skin are discussed. Author

N72-32117*# Boeing Co., Seattle, Wash. Aerospace Group.
EVALUATION OF PLASMA CLEANING AND ELECTRON SPECTROSCOPY FOR REDUCTION OF ORGANIC CONTAMINATION Final Report
May 1972 20 p refs Sponsored by NASA Prepared for JPL
(Contract JPL Order GU-561461)
(NASA-CR-128302) Avail: NTIS HC $3.00 CSCL 06M

The use of Auger spectroscopy to evaluate the effectiveness of plasma cleaning procedures in decontaminating Viking spacecraft is examined. Also investigated was the use of Auger spectroscopy to monitor organic contamination. Results show plasma cleaning can be used effectively to remove organic films and that Auger spectroscopy can be used to monitor organic contamination. E.H.W.

N72-32118*# Kanner (Leo) Associates, Redwood City, Calif.
STUDIES ON THE pH-DEPENDENCE, INHIBITION, AND REACTIVATION OF ANGIOTENSIN 2 AND ANGIOTENSIN 2 AMIDE CLEAVING ENZYMES OF HUMAN PLASMA
M. Zwanzig and W. Oelkers Washington NASA Mar. 1972 17 p refs Transl. into ENGLISH from Z. Klin. Chem. Klin. Biochem. (West Germany), v. 7, 1969 p 253-258 Sponsored by NASA
(NASA-TT-F-14457) Avail: NTIS HC $3.00 CSCL 06P

The pH-dependence of the biological inactivation of alpha-L-aspartyl-angiotensin 2 (A) and of alpha-L-asparaginyl-angiotensin 2 (H) in human plasma was compared. In addition, the pH-dependence of the EDTA inhibition of angiotensinases and its reactivations by divalent metal ions were investigated. Both substrates are cleaved by at least three enzymes with different pH optima. Distinguishable characteristics of the A- and H-inactivating enzymes were found in all pH ranges. Also compared was the pH-dependence of the biological inactivation of H and the cleavage of asparagine from H (aminopeptidase). The results are compatible with the assumption that the enzymes most active at pH 5.6 are endopeptidases and that the enzymes most active in the neutral and alkaline domains are aminopeptidases. Author

N72-32119# Army Aeromedical Research Lab., Fort Rucker, Ala.
THE NEUROLOGICAL EFFECTS OF INH
J. E. Jordan, Stephen Shields, and Dan Bochneak Dec. 1971 121 p refs
(DA Proj. 3A0-62110-A-819)
(AD-744808; USAARL-71-22) Avail: NTIS HC $8.25 CSCL 06/5

Isoniazid (INH) was given for one year to a group of 28 volunteer civilian aviators. Neurological examinations, mental status examinations, EEG's and visual evoked potentials were monitored at control, six months and twelve months. Minor changes were observed in all the measures; none of these changes were severe enough to be of great concern. No evidence was found to justify restriction of flying during INH administration, although the results of this study suggest that careful monitoring of patients taking INH is indicated. Author

N72-32120# Army Aeromedical Research Lab., Fort Rucker, Ala.
EFFECT OF ISONIAZID ON PERFORMANCE 2
Mark A. Hofmann and Richard O. Nossaman Jun. 1971 33 p refs
(DA Proj. 3A0-62110-A-819)
(AD-728823; USAARL-71-23) Avail: NTIS HC $3.75 CSCL 06/5

Seventeen aviators who converted from negative to positive on a tuberculosis time test performed a variety of laboratory tests given before, during, and after INH therapy. The INH was administered prophylactically at dosage levels of 300 mg. per day for one year. The tasks consisted of reaction time (auditory and visual), rotary pursuit tracking, mental multiplication and digit span. The data did not indicate that the drug adversely affected performance, on any of the tasks utilized. Author

N72-32121# Civil Aeromedical Inst., Oklahoma City, Okla.
SONIC BOOMS AND SLEEP: AFFECT CHANGE AS A FUNCTION OF AGE
Roger C. Smith and Gary L. Hutto Jun. 1972 14 p refs
(FAA-AM-72-24) Avail: NTIS HC $3.00

Measurements were made of mood changes resulting from simulated sonic booms occurring during sleep. Subjects from three age groups (21 to 26, 40 to 45, and 60 to 72 years old) spent 21 consecutive nights in a sleeping room equipped for sonic boom simulation. During the sixth through seventeenth nights, simulated sonic booms of 1.0 psf outdoors overpressure level (.1 psf measured inside the sleeping rooms) were presented hourly throughout each night. As the measure of mood, the subjects completed a composite mood adjective checklist in the evening before retiring and in the morning after waking on each of the 21 days. No change in moods attributable to the occurrence of simulated sonic booms was found. Substantial effects relating to the age of subjects, irrespective of boom presentations, were obtained. It was concluded that simulated sonic booms of such low intensity were unlikely to have adverse consequences on the mood states of most individuals. Author

N72-32122# Australian Atomic Energy Commission, Coogee.
IN VITRO STUDY OF THE EFFECT OF GAMMA RAYS ON HUMAN CHROMOSOMES
C. Mouriquand, C. Gilly, C. Wolff, and J. Patet May 1971 17 p Transl. into ENGLISH from Intern. J. Radiation Biol. (London), v. 19, no. 3, 1971 p 263-279 (French Language Doc.)
(LIB/Trans-366) Avail: AEC Depository Libraries

Blood was collected from seven human donors who had never been exposed to radiation. Samples were gamma-irradiated from a Co-60 source in doses of 25 to 500 rads and leukocytes were prepared for cytological examination. Observations on numerical anomalies of chromosomes included hypodiploidy, hyperdiploidy, and tetraploidy. Structural anomalies included chromatid anomalies, chromosome anomalies, monocentric rearrangements, dicentrics, and fragments. The anomalies in chromosome number and structure are described in detail and relationships between radiation dose and chromosome anomalies are shown by means of graphs and tables. A discussion is presented of the present results in comparison to those reported in the literature. Author (NSA)

N72-32123# Battelle-Northwest, Richland, Wash.
IN-PHANTOM DOSIMETRY OF PROTOTYPIC PLUTONIUM CIRCULATORY SUPPORT HEAT SOURCES
F. T. Cross and J. C. Sheppard Feb. 1972 20 p refs Presented at the Symp. on Dosimetry Tech. Appl. to Agr., Ind., Biol., and Med., Vienna, 17 Apr. 1972
(Contract AT(45-1)-1830)
(BNWL-SA-4121; Conf-720411-3) Avail: NTIS

Tissue equivalent human phantoms were used to measure the radiation dose rate to adjacent tissues from a radioisotope heat source used to power blood circulatory support systems. A 30W Pu metal source containing about 900 Ci Pu-238 and 0.58 ppM Pu-236 was used in the heat source system. Photon dose rates were measured with small thermoluminescent dosimeters and neutron dose rates were measured with small tissue-equivalent proportional detectors. A computer code was used for computations of the radiation dose rate. Results indicated that the use of this mechanical heart over a long period of time would not exceed the radiation dose rates established as acceptable for occupational exposure. NSA

N72-32124# Army Foreign Science and Technology Center, Charlottesville, Va.
ESSAYS ON MARINE BIONICS
V. P. Sochivko 17 Apr. 1972 59 p Transl. into ENGLISH of the publ. "Ocherki Bioniki Morya" Leningrad, 1968
(AD-742638; FTD-HT-23-965-70) Avail: NTIS CSCL 06/4

The report consists of two chapters. A theoretical approach to duplicating biological systems of control with man-made devices is described in Chapter 5. The nature of conditioned and unconditioned reflexes in lower organisms is discussed, the possibility that some supposed reflexes even in fishes might really be evidence of mental activity being illustrated with examples. Pattern recognition in living organisms and attempts to duplicate them technologically are described in Chapter 6. Application of geometrical representations and statistical analysis to pattern recognition is discussed. The difficulty in selecting suitable parameters is emphasized. Author (GRA)

N72-32125# Human Factors Research, Inc., Goleta, Calif.
A STUDY OF RECOVERY FUNCTIONS IN MAN Technical Memo, 1 Mar. - 30 Nov. 1971
William Harris and James F. OHanlon Aberdeen Proving Ground, Md. Human Engineering Labs. Apr. 1972 91 p refs
(Contract DAHC04-71-C-0015)
(AD-741828; HEL-TM-10-72) Avail: NTIS CSCL 06/19

Concepts of sustained and continuous military operations were examined with respect to relevant literature. In particular, the objectives were to predict behavioral and biological impairments which might result in those operations; and to determine whether the period necessary for recovery following a sustained operation can be ascertained from the literature. It was concluded that those objectives could not be met due to inadequate information. Nonetheless, the literature did provide data which suggest that certain severe impairments may be experienced by soldiers engaging in sustained and continuous operations. It also provided guidelines for the design of studies to collect the required information. Finally, this review led to a call for serious reevaluation of the current concepts of continuous operations. Author (GRA)

N72-32126# Army Foreign Science and Technology Center, Charlottesville, Va.
MORPHOLOGICAL CHARACTERISTICS OF THE BIOLOGICAL ACTION PRODUCED BY MAGNETIC FIELDS
I. V. Toroptsev 28 Jan. 1972 20 p refs Transl. into ENGLISH from Arkh. Patol. (Moscow), v. 30, no. 3, 1968 p 3-12
(AD-742513; FSTC-HT-23-349-72) Avail: NTIS CSCL 06/18

The author presents a literature survey on the biological action of magnetic fields and the results of experimental-morphological investigations, carried out at his laboratory. As demonstrated, direct magnetic field, 7,000 oersted in intensity, and an indirect on (50 cycles per sec.), 200 oersted in intensity possessed a marked biological effect. In the mentioned physical conditions and an equal exposure (6 1/2 hours) the indirect field proved to be more active. Direct and indirect magnetic fields proved to induce disturbance of hemodynamics and lymph circulation. Histological investigations demonstrated a paretic dilatation of capillaries, edema of the lungs and of the testicles. Dynamic investigations pointed to normalization of morphological picture 30 days after the field action. The magnetic fields (direct and indirect) failed to depress the regeneration. Author (GRA)

N72-32127# Pennsylvania Univ., Philadelphia. School of Medicine.
HISTOPATHOLOGY OF ARGON LASER-INDUCED RETINAL LESIONS Final Report, 1 Aug. 1970 - 31 Jan. 1971
Myron Yanoff Apr. 1972 9 p refs
(Contract DADA17-70-C-0011)
(AD-741380; Rept-3) Avail: NTIS CSCL 06/5

Information was obtained on the biologic effects of the argon laser on the retina. In addition, the biological retinal effects of other lasers (ruby, gallium arsenide, neodynium and carbon dioxide) were carried out. The pigment epithelium was the most sensitive area of the retina exposed to threshold argon and ruby laser energies. The photoreceptor and outer nuclear layers were the next most sensitive retinal areas exposed to argon radiation. The inner layers of the retina seemed to be relatively unaffected by the argon laser at threshold energies, and all layers except the retinal pigment epithelium were relatively unaffected by the ruby laser at threshold energies.
Author (GRA)

N72-32128# School of Aerospace Medicine, Brooks AFB, Tex.
DEVICE FOR THE DETERMINATION OF THE STABILITY OF STANCE AND THE FINE ADJUSTMENTS TO BODY EQUILIBRIUM
A. B. Venediktov, Yu. V. Terekhov, and M. I. Tishchenko 1972 11 p refs Transl. into ENGLISH from Russian Language Article
(AD-741265; SAM-TT-R-1116-0472) Avail: NTIS CSCL 06/16

The stabilograph was used to study the stability of stance of a group of healthy subjects. Based on this study the following parameters were found to be most important: frequency of fluctuation of the center of gravity of the human body in the sagittal and frontal planes, mean amplitude of these fluctuations, mean maximum fluctuation amplitude, and the ratio of the mean fluctuation amplitude with the eyes closed to the mean amplitude with the eyes open. The obtained data represents the first steppingstone toward the utilization of the stabilographic technic in clinical practice. Author (GRA)

N72-32129# Monitor Labs., Inc., Rockville, Md.
DEVELOPMENT OF DATA ACQUISITION FACILITIES AND DATA ANALYSIS SERVICES APPLICABLE TO EXPERIMENTAL HYPERBARIC PHYSIOLOGY Final Report
Paul E. Wilkins 10 Apr. 1972 8 p
(Contract N00014-71-C-0026)
(AD-744053) Avail: NTIS CSCL 06/19

Facilities for data acquisition and analysis were expanded and improved at the Bethesda, Md. Naval Medical Research Institute. These facilities are used as a research tool in studies of the hyperbaric physiology of human and animal subjects.
Author (GRA)

N72-32130# Human Engineering Labs., Aberdeen Proving Ground, Md.
ANALYSIS OF PILOT'S EYE MOVEMENTS DURING HELICOPTER FLIGHT
John A. Barnes Apr. 1972 137 p refs
(AD-742276; HEL-TM-11-72) Avail: NTIS CSCL 05/10

Eye movement data from the 21 maneuvers flown during the tactical utility helicopter information transfer study were analyzed to determine the scanning patterns, link value, dwell

times and dwell fractions. These data and data from the major eye movement studies conducted since 1944 are presented in the same numerical format. The dwell fractions and mean dwell times for similar maneuvers are compared and the link diagrams for these maneuvers are given when the data was available. The aircraft which were flown or simulated in these studies include the U.S. Navy NH-1 (Howard DGA-15), PBY-5-A, and A-4; the U.S. Air Force C-45, T-33, and F-102; the U.S. Army UH-1B; the Boeing 707, the McDonnell-Douglas DC-8, and the Lockheed L-188. Author (GRA)

N72-32131# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

THE DYNAMIC ENVIRONMENT DURING EMERGENCY DESCENT OF HIGH ALTITUDE/MULTI-MACH TRANSPORT AIRCRAFT Interim Report

Harald J. VonBeckh and Siegried J. Gerathewohl 30 Dec. 1971 26 p refs

(Contract DOT-FA71WA1-232)

(AD-741686; NADC-CS-7133) Avail: NTIS CSCL 06/19

During the post decompression emergency descent the occupants will be subjected to deceleration induced inertial loads in the direction of the flight path. According to the selected flight path the aircraft's attitude angle will fluctuate and may reach or exceed minus 10 degrees. The resultant G vector will therefore be increased and shifted forward, i.e. the resulting G-load will tend to displace the forward facing occupant forward-downwards. Experiments with chimpanzees have shown that the recovery from the decompression and subsequent hypoxic stress is faster for subjects in semi-supine position, as compared with those in seated postion. It is suggested to simulate both, the atmospheric and dynamic events in centrifuge experiments, comparing the behavioral and physiological reactions of forward as well as aft facing subjects. The results could serve for a reassessment of the value of aft-facing versus forward-facing passenger seats.
Author (GRA)

N72-32132# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

A DIGITAL SIMULATION OF PSYCHOLOGICAL CORRELATES OF A MODEL OF THE HUMAN VISUAL SYSTEM M.S. Thesis

William O. Ragsdale Mar. 1972 66 p refs

(AD-742431; GE/EE/72-19) Avail: NTIS CSCL 05/10

The purpose of this investigation is to establish psychological correlates for a transform model of the human visual system and to determine the model's ability to exhibit Gestalt grouping principles and visual illusions. Psychological correlates were obtained by comparing human visual performance to the computer model's performance; the correlation factors were high. Patterns containing Gestalt grouping principles and various visual illusions were presented to the filtered transform model to determine its ability to exhibit them in reconstructed images after low-pass filtering. Reconstructed images clearly show these characteristics.
Author (GRA)

N72-32133# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FUNCTION OF THE ORGAN OF EQUILIBRIUM AND MOTION SICKNESS

K. L. Khilov 13 Mar. 1972 345 p refs Transl. into ENGLISH from the monograph "Funktsiya Organa Rabnovesiya Ibolezn Peredvizheniya" 1969 p 1-279

(AD-742409; FTD-HC-23-325-71) Avail: NTIS CSCL 06/19

Motion sickness, or as it used to be called, seasickness, can develop in passengers on any form of transportation when there is angular or linear acceleration which can adequately stimulate vestibular receptors. This sickness is most often observed and is most severe in air and sea travel by persons with heightened excitability of the vestibular analyzer. The monograph presents data on the role of higher sections of the central nervous system in the development of vestibular symptoms which are a form of motion sickness. The report also describes rigorous vestibular tests the author and co-workers developed. These tests are in the form of an otolithic reaction, a test with cumulative otolithic stimulation and study of vestibular sensitivity to Coriolis acceleration, e.e., tests modeling actual situations when traveling in the air. Author (GRA)

N72-32134# Walter E. Fernald State School, Waverly, Mass. Eunice Kennedy Shriver Center.

CONCURRENT SCHEDULE CONTROL OF HUMAN EYE MOVEMENT BEHAVIOR Final Report

Peter B. Rosenberger 1 Sep. 1971 17 p refs

(Contract DADA17-70-G-9317)

(AD-741397; Rept-1) Avail: NTIS CSCL 05/10

Operant conditioning techniques were applied to the study of how human looking behavior is controlled by what is seen. In a standard vigilance setting, gaze at three illuminable volt meters was monitored by a Mackworth television eye camera with automatic recording capability. Gaze at a given meter produce illumination of the meter, and signals (deflections of the needle on the meter) were programmed as intermittent consequences of this response. Looking behavior was thus placed under the control of concurrent variable ratio, DRL and fixed interval schedules in normal adult volunteers. The effects of 24-hour sleep deprivation on this schedule control were studied in a single subject. The results showed that deterioration in signal detection under conditions of fatigue was a reflection of a decreased rate of observing responses, rather than a decreased efficiency of signal detection per observing response. It was concluded that concurrent schedule control is an effective experimental tool for studying the effects of display and physiological variables on human eye movement behavior.
Author (GRA)

05 BIOTECHNOLOGY

Includes life support systems, human engineering, protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

N72-32135*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

OPERATION AND MAINTENANCE, FIRE RESCUE AIR-PACK. VOLUME 2: COMMUNICATIONS

1 Jun. 1972 43 p

(NASA-CR-68614; KSC-TM-626-Vol-2) Avail: NTIS HC $4.25 CSCL 06K

The operation and maintenance procedures are described for the development model of the fire rescue air pack (FRAP) voice amplifier assembly, including the battery charger. Operational instructions include a general description of the assembly, specifications, and installation and operation. Maintenance instructions include theory of operation, preventive maintenance, repair, adjustment, and a parts list. The FRAP is intended to permit fire rescue personnel to enter a smoke-filled, toxic or oxygen depleted environment carrying their own source of breathing air. The voice amplifier assembly permits the wearer to communicate by voice with other persons in the vicinity. The battery charger assembly provides a means of keeping the amplifier batteries fully charged. Author

N72-32136# Royal Aircraft Establishment, Farnborough (England).

ERGONOMICS AND ITS IMPORTANCE IN THE DEVELOPMENT OF FIGHTING VEHICLES

H. Schroetter Aug. 1972 17 p refs Transl. into ENGLISH from Truppenpraxis, no. 1, 1972 p 28-32

(RAE-Lib-Trans-1658; BR-31115) Avail: NTIS HC $3.00

The psychophysical, and mechanical aspects of man's adaptability to the military technological environment are discussed

in terms of arranging the tasks in a fighting vehicle to the capabilities of the soldier. The driver's compartment in a fighting vehicle was chosen for consideration. The following items are discussed: body dimensions, seat design, pedals, steering, levers, instruments, switches, and fighting space. F.O.S.

N72-32137# Michigan Univ., Ann Arbor. Electronic Systems Lab.
SIMULATOR EVALUATION OF PILOT ASSURANCE DERIVED FROM AN AIRBORNE TRAFFIC SITUATION DISPLAY Final Project Report, 1 Jul. - 31 Feb. 1971
Jack D. Howell Feb. 1972 165 p refs
(Contracts DOT-FA71WAI-234; F19628-70-C-0230)
(FAA-EM-72-3) Avail: NTIS HC $10.25

Tests were run on a transport cockpit simulation facility to evaluate the pilot assurance value of airborne displays used as traffic situation monitors in high-density terminal airspace. The twenty professional pilots employed as subjects were exposed to a set of typical normal and abnormal terminal approach situations. Their level of assurance was determined from their detailed knowledge of each situation, measured by stop-action quizzes, and the ability to detect conflicts. Work-load or the degree of difficulty the pilots experienced in acquiring relevant information about the situation was also regarded as a component of assurance. Specific problem areas emphasized in the test scenarios were simultaneous approaches to closely-spaced parallel runways, blunder detection and resolution, and providing a picture for the pilot when discrete address data links replace current ATC party-line communications. As defined above, pilot assurance was found to increase markedly when a traffic situation display was available. Author

N72-32138*# Spacelabs, Inc., Chatsworth, Calif.
BIOMEDICAL GROUND LEAD SYSTEM Final Report
22 Aug. 1972 27 p
(Contract NAS9-11442)
(NASA-CR-128536; SR-72-1080) Avail: NTIS HC $3.50 CSCL 06B

The design and verification tests for the biomedical ground lead system of Apollo biomedical monitors are presented. Major efforts were made to provide a low impedance path to ground, reduce noise and artifact of ECG signals, and limit the current flowing in the ground electrode of the system. E.H.W.

N72-32139*# Scientific Translation Service, Santa Barbara, Calif.
THE CONQUEST OF OUTER SPACE
T. Gualtierotti Washington NASA Oct. 1972 13 p Transl. into ENGLISH from the Italian document La Conquista dello Spazio Esterno, 1972
(Contract NASw-2035)
(NASA-TT-F-14535) Avail: NTIS HC $3.00 CSCL 05E

The particular sensations associated with space flight, as well as changes in body functions and blood composition are discussed. The OFO-A experiment is described in detail. Author

N72-32140# Argonne National Lab., Ill.
RADIOLOGICAL PHYSICS DIVISION ANNUAL REPORT, JULY 1970 - JUNE 1971
Jun. 1971 325 p refs
(Contract W-31-109-eng-38)
(ANL-7860-Pt-2) Avail: NTIS

Exposure data for radium patients is presented. Radiation dosage distribution and effects were considered. K.P.D.

N72-32141# Battelle-Northwest, Richland, Wash. Biology Dept.
COMPLETELY IMPLANTABLE THREE CHANNEL TEMPERATURE BIOTELEMETRY SYSTEM
J. R. Decker and M. F. Gillis [1971] 8 p refs Presented at the 9th Rocky Mountain Bioeng. Symp. and the 10th Biomed. Sci. Instr. Symp., Omaha, May 1972
(Contract AT(45-1)-1830)
(BNWL-SA-4231; Conf-720508-1) Avail: NTIS

A completely implantable three channel pulse modulated transmitter and corresponding external receiver were developed to telemeter, from free ranging animals, body temperature and internal temperatures of an intracorporeal radioisotope heat source cooled by flowing blood. Temperatures ranging from 4 to 80 C can be telemetered over a range of 4 meters. Life expectancy of the device exceeds 10 months with calibration accuracy maintained to within 0.2 deg C. Author (NSA)

N72-32142# Air Force Human Resources Lab., Williams AFB, Ariz. Flying Training Div.
USING A GROUND TRAINER IN A JOB SAMPLE APPROACH TO PREDICTING PILOT PERFORMANCE
Ronald A. Goebel, David R. Baum, and William V. Hagin Nov. 1971 26 p refs
(AF Proj. 1123)
(AD-741747; AFHRL-TR-71-50) Avail: NTIS CSCL 05/9

The report documents a novel application of the job sample approach to screening candidates for Air Force Undergraduate Pilot Training. The job sample approach consists of obtaining work samples during early training or simulating work situations prior to training and deriving measures of performance from either for use as predictors of future job success. Two specially instrumented and slightly modified Link GAT-1 trainers (General Aviation Trainer for single engine, propeller driven aircraft) were used to present incoming students with two types of tasks: tracking tasks and aircraft maneuvers. Several classes of data, (e.g., tracking measures, maneuver measures, GAT-1 instructor pilot grades, were generated. Criterion data were check ride grades. Three important findings emerged: The concept of job sampling for screening purposes appears to be valid and should be vigorously pursued; the T-41 continues to predict subsequent performance in jet pilot training; and the ground trainer is a useful vehicle for predicting pilot success and should be given further study to assess its proper role in jet pilot screening.
Author (GRA)

N72-32143# Michigan State Univ., East Lansing. Lansing Computer Inst. for Social Science Research.
CHOOSING AMONG ALTERNATIVE DISTRIBUTIONS OF REWARDS
Lawrence A. Messe 1971 27 p refs Submitted for Publication
(Contract F44620-69-C-0114)
(AD-741176; AFOSR-72-0983TR) Avail: NTIS CSCL 05/10

Men can live together because they develop norms, or rules of conduct, which guide their interpersonal relations. Such rules can only serve their purpose to the extent that members of the group are willing to conform to them. The present research indicates that the norm of fairness, manifested in role symmetry, has the power to affect behavior. Author (GRA)

N72-32144# Illinois Univ., Urbana. Biological Computer Lab.
ACCOMPLISHMENT SUMMARY 1971-1972 OF THE BIOLOGICAL COMPUTER LABORATORY Report for 1 Jun. 1971 - 31 May 1972
1 Jun. 1972 278 p refs
(Grant AF-AFOSR-1865-70; AF Proj. 9768)
(AD-744009; BCL-72.2; UILU-ENG-72-2529; AFOSR-72-1216TR) Avail: NTIS CSCL 06/4

Investigations into linguistic interactions and logic are summarized. The application of those and related concepts to models of cognition, education, and information retrieval is discussed. An alternative to conventional retrieval systems is described. Formal studies in description and four-dimensional perception are proposed. Theoretical results in neurophysiology and program analysis are presented. To information theory is contributed a new measure of diversity. Experimental work in sampling techniques is advanced, and its application to medicine and speech synthesis described. Author (GRA)

06 CHEMISTRY

Includes chemical analysis and identification (e.g., spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

N72-32145*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
PROPERTIES OF MATERIALS IN HIGH PRESSURE HYDROGEN AT ROOM AND ELEVATED TEMPERATURES
Annual Report, 29 Jun. 1971 - 30 Jun. 1972
J. A. Harris, Jr. 30 Jun. 1972 66 p refs
(Contract NAS8-26191)
(NASA-CR-123829; AR-2; PWA-FR-5129) Avail: NTIS HC $5.50 CSCL 07D

Experimental efforts in this program for this period. Mechanical property tests of wrought and cast nickel-base alloys and one wrought cobalt-base alloy were conducted in 34.5 MN/sq m (5000-psig) helium and hydrogen or hydrogen mixtures. Comparison of test results was made to determine degradation of properties due to the hydrogen environments. All testing was conducted on solid specimens exposed to external gaseous pressure. Specific mechanical properties determined and the testing methods used are summarized. Author

N72-32146# Royal Aircraft Establishment, Farnborough (England).
THE INHIBITION OF THE THERMAL DISCOLOURATION OF POLYACRYLONITRILE, PART 1
J. Runge and W. Nelles Jul. 1972 22 p refs Transl. into ENGLISH from Faserforsch. Textiltech. (Berlin), v. 21, no. 3, 1970 p 105-110
(RAE-Lib-Trans-1593-(A)-Pt-1) Avail: NTIS HC $3.25

The discoloration of polyacrylonitrile between 120 and 2000 C is, as far as it is caused by nucleophilic initiated condensation of nitrile groups, effectively inhibited by maleic acid, maleimide, and its N-substituted products. Author

N72-32147# Royal Aircraft Establishment, Farnborough (England).
THE INHIBITION OF THE THERMAL DISCOLOURATION OF POLYACRYLONITRILE, PART 2: INVESTIGATION INTO THE INHIBITION MECHANISM
J. Runge Jul. 1972 18 p refs Transl. into ENGLISH from Faserforsch. Textiltech. (Berlin), v. 22, no. 1, 1971 p 1-6
(RAE-Lib-Trans-1593-(B)-Pt-2) Avail: NTIS HC $3.00

The inhibition of anaerobic thermal discoloration of polyacrylonitrile by maleimide was demonstrated by IR-spectroscopy. Investigations of the solubility of polyacrylonitrile samples heated in the presence of maleimide support previous concepts on the mechanism of stabilization. Further discoloration processes, that might have an extent comparable to that of the condensation of nitrile groups, are not likely to occur. Author

N72-32148*# Scientific Translation Service, Santa Barbara, Calif.
OXIDATION OF TUNGSTEN AND MOLYBDENUM IN OXYGEN ATMOSPHERES AT LOW PRESSURES AND HIGH TEMPERATURES
Georg Wahl Washington NASA Sep. 1972 35 p refs Transl. into ENGLISH of "Oxydation von Wolfram und Molybdaen in Sauerstoff-Atmosphaere bei Niederen Drucken und Hoher Temp." Mannheim, West Ger., Brown, Boveri and Cie AG, 1971 37 p Presented at the Surface-Vacuum-Space Symp., Leige, 15-16 Apr. 1971
(Contract NASw-2035)
(NASA-TT-F-14559) Avail: NTIS HC $3.75 CSCL 07D

A description is given of a method for oxidation of tungsten and molybdenum in which the oxide which forms on a circular plate of the metal is deposited on a cold collector plate 1 to 2 mm away. The oxide deposit is measured with an electron microprobe, and the profile of the coating thickness is used to calculate oxidation characteristics. Results agree with those in the literature. Author

N72-32149# Joint Publications Research Service, Arlington, Va.
ANOMALOUS WATER: HYPOTHESIS AND FACTS
B. Deryagin 18 Sep. 1972 14 p Transl. into ENGLISH from Nauka i Zhizn, (Moscow), no. 4, 1972
(JPRS-57043) Avail: NTIS HC $3.00

The results of investigations of anomalous water in the USSR and abroad are discussed. Author

N72-32150# Royal Aircraft Establishment, Farnborough (England).
A STUDY OF THE DIFFUSION OF CATHODIC HYDROGEN IN IRON USING THE ELECTROCHEMICAL DETECTION TECHNIQUE
J. L. Dillard Jul. 1972 17 p refs Transl. into ENGLISH from Mem. Sci. Rev. Met. (Paris), v. 67, no. 12, 1970 p 767-775
(RAE-Lib-Trans-1667; BR-31114) Avail: NTIS HC $3.00

The diffusion of cathodic hydrogen through pure-iron membranes has enabled a detailed study of the mechanism of diffusion to be carried out. The effects of cathodic current density and membrane thickness were examined. The diffusion coefficient for hydrogen in zone refined iron is given. Author

N72-32151*# Agnew Tech-Tran, Woodland Hills, Calif.
PYROLYSIS GAS CHROMATOGRAPHY OF AMINO ACIDS AND PROTEINS
Kazuo Anomata and Yoichiro Mashiko Washington NASA Mar. 1972 19 p refs Transl. into ENGLISH from Nippon Kagaku Zasshi (Tokyo), v. 87, 1966 p 57-62 Prepared for JPL
(Contract NAS7-100)
(NASA-TT-F-14483) Avail: NTIS HC $3.00 CSCL 07D

Pyrolysis gas chromatography was performed to estimate quickly and simply the amino acid composition. Two types of columns were constructed for use in the experiment. Considering that the ratios of the peak areas of pyrolysis gas chromatography patterns of eighteen kinds of amino acids differ according to their types, it was concluded that they should be compared with the pyrolysis patterns of amino acids. By using milk-casein and egg-albumin as protein samples, the amino acid composition was estimated from the ratios of the peak areas and the types. To confirm the results, the protein samples were analyzed in the amino acid analyzer and compared. They were found to be nearly identical except for a few amino acids whose patterns were less distinctive. Author

N72-32152*# National Aeronautics and Space Administration, Washington, D.C.
ON A FORMAL INCONSISTENCY DEDUCED FROM THE CONCEPT OF GELIFICATION OF MULTIFUNCTIONAL MACROMOLECULAR COMPOUNDS ACCORDING TO CLASSICAL THEORY
Claude M. Bruneau Jun. 1972 7 p refs Transl. into ENGLISH from Compt. Rend. Acad. Sci. (Paris), v. 264, 3 Apr. 1967 p 1168-1171
(NASA-TT-F-14487) Avail: NTIS HC $3.00 CSCL 07D

The gelification is discussed of a multifunctional macromolecular system which occurs when infinitely large molecules appear, and the theoretical value of the mean degree of polymerization by weight becomes infinite. The theoretical values of the mean degrees of polymerization by weight near gelification are compared for a group of systems derived from monomers of functionality f. The discrete character of the variable measuring the evolution of the polymerization or polycondensation reaction is taken into account. For the same relative distance, corresponding in absolute value to a smaller distance if counted in numbers of chemical bonds needed to reach gelification, it is shown that the mean degree of polymerization by weight may be very different and smaller when the system functionality is larger. Author

N72-32153*# National Aeronautics and Space Administration, Washington, D.C.
ON THE INTERPRETATION OF THE INFINITE VALUE OF THE DEGREE OF POLYMERIZATION ACCORDING TO CLASSICAL THEORY
Claude M. Bruneau Jun. 1972 7 p refs Transl. into ENGLISH from Compt. Rend. (Paris), v. 264, 27 Feb. 1967
(NASA-TT-F-14486) Avail: NTIS HC $3.00 CSCL 07C

The classical expressions, which in certain cases attribute an infinite value to the mean degree of polymerization by number, are shown to be replaced by a formalism based on elementary topological considerations extracted from the graph theory. It leads to an axiomatic definition of the concepts of intermolecular and intramolecular bonds, as well as characteristic quantities, notably those measuring cyclization. Author

N72-32154*# Agnew Tech-Tran, Woodland Hills, Calif.
PYROLYSIS OF CELLULOSE
Kunio Kato, Toshiko Doihara, and Fukumi Sakai Washington NASA Jun. 1972 20 p refs Transl. into ENGLISH from J. Japan Agr. Chem. Soc. (Noka), v. 40, no. 12, 1966 p 443-448
(Contract NAS7-100)
(NASA-TT-F-14503) Avail: NTIS HC $3.00 CSCL 07D

The thermal decomposition products of cellulose are considered. The extraction and classification of pyrolysis derivatives are also discussed. K.P.D.

N72-32155*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GADOLINIUM-HYDROGEN ION EXCHANGE OF ZIRCONIUM PHOSPHATE
David C. Liu and John L. Power Washington Oct. 1972 20 p refs
(NASA-TN-D-7053; E-7061) Avail: NTIS HC $3.00 CSCL 07D

The Gd(+3)/H(+) ion exchange on a commercial zirconium phosphate ion exchanger was investigated in chloride, sulfate, and phosphate solutions of Gd(+3) at gadolinium concentrations of 0.001 to 1 millimole per cc and in the pH range of 0 to 3.5. Relatively low Gd(+3) capacities, in the range of 0.01 to 0.1 millimole per g of ion exchanger were found at room temperature. A significant difference in Gd(+3) sorption was observed, depending on whether the ion exchanger was converted from initial conditions of greater or lesser Gd(+3) sorption than the specific final conditions. Correlations were found between decrease in Gd(+3) capacity and loss of exchanger phosphate groups due to hydrolysis during washing and between increase in capacity and treatment with H3PO4. Fitting of the experimental data to ideal ion exchange equilibrium expressions indicated that each Gd(+3) ion is sorbed on only one site of the ion exchanger. The selectivity quotient was determined to be 2.5 + or - 0.4 at room temperature on gadolinium desorption in chloride solutions.
Author

N72-32156*# Kanner (Leo) Associates, Redwood City, Calif.
DESORPTION OF OXYGEN FROM TUNGSTEN BY MEANS OF ELECTRON IMPACT
A. Klopfer Washington NASA Jun. 1972 23 p refs Transl. into ENGLISH from Vakuum-Tech. (West Germany), v. 1, 1970 p 1-8 Sponsored by NASA
(NASA-TT-F-14481) Avail: NTIS HC $3.25 CSCL 07D

The effect of electron impact on oxygen adsorbed on polycrystalline tungsten has been investigated with the aid of mass spectrometers. From these investigations and from thermal desorption and adsorption measurements, the existence of three adsorption states at 430 K has been concluded. Desorption by electron impact from the state in which the oxygen is most strongly bonded to the tungsten could not be detected with certainty. Atomic oxygen ions and neutral particles, which are very probably oxygen atoms, are liberated from the second states. The cross section for the neutral particles is 8 x 10 to the minus 19th power sq cm; for the ions, 3 x 10 to the minus 21st power sq cm. Oxygen molecules and atomic oxygen ions were desorbed from the state in which the oxygen is loosely bonded and in which the coverage amounts to only 2% of the total quantity of gas adsorbed. The cross section of electron desorption for O2 is 1.5 x 10 to the minus 17th power sq cm; for desorption of O(+) 7 x 10 to the minus 20th power sq cm.
Author

N72-32157*# National Aeronautics and Space Administration, Washington, D.C.
A CONTRIBUTION TO RESEARCH ON NICKEL HYDROXIDES
Jean Labat Jun. 1972 69 p refs Transl. into ENGLISH from Ann. Chim. (Paris), v. 9, no. 7-8, Jul.-Aug. 1964 p 399-427
(NASA-TT-F-14448) Avail: NTIS HC $5.50 CSCL 07D

Results are presented of research undertaken to study the magnetism of nickel hydroxides, their chemical analysis, the X-ray spectrum, and their electrochemical properties depending upon the method used in their preparation. Author

N72-32158# Aktiebolaget Atomenergi, Studsvik (Sweden).
ELECTROCHEMICAL METHODS FOR CONTINUOUS MEASUREMENT OF CORROSION RATES ESPECIALLY WITH HIGH TEMPERATURE EQUIPMENT MADE OF CARBON STEEL, STAINLESS STEEL 18/8, AND ZIRCALOY-2
P. Tarkpea, B. Johansson, W. Huebner, and K. Lundberg Oct. 1971 69 p refs In SWEDISH
(STU-70-394/U-325; AE-MK-271) Avail: AEC Depository Libraries

An examination is described with the aim of developing a measuring method for continuous measurement of corrosion rates during operation at high temperature. The measurements are based on determination of the potential (polarization) as a function of an applied current in a range near the corrosion potential. In the proportional constants, the so-called Tafel constants are included, i.e., the derivatives in the ranges of strong anodic or cathodic polarization, where the counteracting process can be neglected and a logarithmic function is adequate (Tafel curves). The polarization resistance has been measured and the Tafel constants have been determined for carbon steel, stainless steel 18/8 in de-ionized water with high, about 2ppM, and low, about 0.5 ppM, O2 at 250 C, and for Zircaloy-2 in equivalent water at 300 C. This environment is of interest in nuclear reactor operation. NSA

N72-32159# California Univ., Livermore. Lawrence Livermore Lab.
CORRELATION OF THEORY AND EXPERIMENT FOR HIGH PRESSURE HYDROGEN
William G. Hoover, Marvin Ross, C. F. Bender, Forrest Rogers, and R. Olness [1972] 14 p refs Presented at the High Pressure Phys. and Planetary Interiors Conf., Houston Sponsored by AEC
(UCRL-73846; CONF-720318-1) Avail: NTIS

Recent quantum calculations and high pressure experiments agree on the magnitude of the forces with which hydrogen molecules interact. The calculated forces have to be determined in two steps: the repulsion is determined by Hartree-Fock calculations, while the attraction is deduced semi-empirically. The experimental forces were inferred from recent data on hydrogen shock compressed to 214 kilobars. The agreement indicates the usefulness of a pair potential description of dense hydrogen and suggests using potentials consistent with both theory and experiment that pressures of at least 1.7 megabars will be required to make metallic hydrogen. The expected lifetime of the metal at atmospheric pressure is very short.
Author (NSA)

N72-32160# California Univ., Berkeley. Lawrence Berkeley Lab. Inorganic Materials Research Div.
LABORATORY CHEMICAL KINETICS AS AN ATMOSPHERIC SCIENCE

Harold Johnston Feb. 1972 71 p refs Presented at Survey Conf., Cambridge, Mass., 15-16 Feb. 1972
(Contract W-7405-eng-48)
(LBL-497; Conf-720210-1) Avail: NTIS

It is shown that one laboratory reaction (the N2O5 catalyzed decomposition of ozone) can be exactly predicted from other laboratory reactions. It is also shown that a noncontroversial atmospheric quantity (the vertical profile of singlet delta oxygen molecules) can be predicted satisfactorily from chemical rate constants obtained in the laboratory. The chemical and photochemical constants of the pure air substances, O, O2, and O3, are fairly well known, and these constants predict about twice as much stratospheric ozone in clean air as that observed, implicating some other agent or agents in the natural destruction of ozone. Neither transport to the troposphere nor the water reactions are adequate (by about a factor of 50) to explain the ozone deficit. Author

N72-32161# Parametrics, Inc., Waltham, Mass.
LABORATORY INVESTIGATION OF ABSOLUTE INTENSITY CONSTANTS OF METALLIC AND ALKALINE EARTH OXIDES BY NONSHOCK TUBE METHODS Final Report, 17 Feb. 1969 - 31 Dec. 1971
Tunis Wentnk, Jr. and Gerald Diebold 31 Jan. 1972 54 p refs
(Contract F19628-69-C-0172; AF Proj. 8608)
(AD-744061; AFCRL-72-0191) Avail: NTIS CSCL 07/4

A three-year study of the measurement and analyses of molecular energy level radiative lifetimes is presented. The experiments, using blowoff vapor produced by a focused pulsed ruby laser, are described. Radiation damage near threshold is reported and discussed; such thresholds we measured were significantly lower than those reported by others. New absolute intensity constants for BaO and VO are presented, and compare well with the results from other methods. The validity of the laser blowoff method in determining meaningful level lifetimes is treated. Recommendations for future work are given. Other major publications resulting from this contract are described briefly in two appendixes. Author (GRA)

N72-32162# Aerospace Corp., El Segundo, Calif. Lab. Operations.
HEAT OF FORMATION AND ENTROPY OF C3 MOLECULE
Francis M. Wachi and Donald E. Gilmartin 30 May 1972 28 p refs
(Contract F04701-71-C-0172)
(AD-744046; TR-0172(2250-40)-7; SAMSO-TR-72-129) Avail: NTIS CSCL 07/4

Partial pressures of C3(g) have been measured with a high-resolution mass spectrometer and a Knudsen effusion cell in the temperature range from 2300 to 2800 K. The third-law heat of formation was derived with the thermodynamic functions of Strauss and Thiele as was the second-law value. The entropy values were also determined. GRA

N72-32163# Army Edgewood Arsenal, Md. Chemical Lab.
CHEMICAL IONIZATION ION CLUSTER MASS SPECTROMETRY Technical Report, Jun. - Dec. 1971
Thomas C. Imeson and Charles S. Harden May 1972 17 p refs
(DA Proj. 1W6-62710-A-D-29)
(AD-743453; EA-TR-4642) Avail: NTIS CSCL 07/4

An extension of the technique of chemical ionization mass spectrometry utilizing moist N2 or air as the reactant gas has been studied. Ionic clustering reactions involving protonated water clusters and trace quantities of organic impurities are initiated in a corona discharge at pressures ranging from 20 to 220 Torr. The ionic reaction products are analyzed with a quadrupole mass spectrometer. A mechanism is proposed for the formation of ions of the type H(+)(H2O)x(A)y where A is the trace impurity. Results of detection studies on dimethyl methylphosphonate (concentration = 0.6 mole parts per million or 3.3 micro g/l) and dimethyl sulfoxide are reported. Author (GRA)

N72-32164# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPECIFIC HEAT OF A SUBSTANCE NEAR THE CRITICAL POINT OF HEAT AND GAS
M. Sh. Giterman 24 Mar. 1972 12 p refs Transl. into ENGLISH from Tr. Inst. Kom. Stand., Mer Izmer. Prib. Sov. Min. SSSR (Moscow), no. 80, 1966 p 83-88
(AD-744251; FTD-HC-23-1795-71) Avail: NTIS CSCL 07/4

The presence of extremums for a constant volume, C(v), in the supercritical area is explained in a hypothesis on the nature of C(v) at the critical point. In the article, the author discusses the behavior of the heat capacity jump on the coexistence curve, and analyzes the behavior of C(P) in the supercritical area. All of these investigations enable him to determine the parameters of the equation of the substance's state near the critical point. Author (GRA)

N72-32165# Avco Corp., Lowell, Mass. Systems Div.
EXPLORATORY DEVELOPMENT TO STUDY GRAPHITE VAPORIZATION KENETICS AND THERMODYNAMICS USING THE MODULATED BEAM MASS SPECTROMETER Quarterly Report, 1 Nov. 1971 - 31 Jan. 1972
Warren C. Steele and Frederick N. Bourgelas 31 Jan. 1972 20 p refs
(Contract F33615-71-C-1509)
(AD-744494; AVSD-0152-72-CR; QR-3) Avail: NTIS CSCL 07/4

Progress is reported in a program of mass spectrometric studies of graphite vaporization kinetics. A renewed search for polymers in the carbon vapor over very hot graphite has resulted in detection of the new species C12, C13, C14, and C15. A new carbon vapor source producing a beam 99% atomic carbon has been developed for vapor reflection experiments. Some initial experiments are described which reveal unexpected C3 desorption during flash vaporization of material condensed from the atomic beam on the graphite target. Author (GRA)

N72-32166# Miami Univ., Oxford, Ohio. Dept. of Chemistry.
CHEMICAL, STRUCTURAL AND ANALYTICAL RESEARCH Annual Summary Report, 1 Sep. 1970 - 30 Sep. 1971
John E. Katon Wright-Patterson AFB, Ohio AFML Feb. 1972 37 p refs
(Contract F33615-70-C-1021; AF Proj. 7360)
(AD-744107; AFML-TR-71-280) Avail: NTIS CSCL 07/4

The report summarizes the research programs and service functions covering determination of molecular structures, characterization of materials and development and application of analytical techniques of various kinds. The contract also involves various services supplied the Air Force in support of their inhouse programs. The major areas of research were in emission spectrometry, mass spectrometry, microchemical analyses and vibrational sepectroscopy. Author (GRA)

N72-32167# Harvard Coll. Observatory, Cambridge, Mass. Solar Satellite Project.
[SHOCK TUBE SPECTROSCOPY] Final Report, 1 Feb. 1968 - 1 Jan. 1972
W. H. Parkinson and Edmond M. Reeves May 1972 8 p refs
(Contract N00014-67-A-0298-0016; NR Proj. 014-112)
(AD-744311) Avail: NTIS CSCL 07/4

The report summarizes work with a free piston compressor that has been used to produce high pressure helium in which the line-broadening of the Na 588.9 nm line has been studied. Additional work on the measurement of Fe I oscillator strengths by means of the 'hook method' are discussed. Author (GRA)

N72-32168# Photochem Industries, Inc., Fairfield, N.J.
ATOMIC OXYGEN ABSORPTION CELL SYSTEM Final Report, 15 Apr. 1970 - 15 Dec. 1971
Anthony E. Cerkanowicz, Donald R. Simon, Maurice E. Levy, and Robert J. Strone 15 Dec. 1971 69 p refs
(Contract F19628-70-C-0252; AF Proj. 8627)

(AD-744097; PII-3038-8; AFCRL-72-0249) Avail: NTIS CSCL 07/4

An atomic oxygen absorption cell system has been developed for application in the measurement of absorption cross sections of atomic oxygen at wavelengths shorter than 910 A (the first ionization threshold). The system is based on vacuum ultraviolet photodissociation of oxygen molecules via absorption of light in the Schumann-Runge continuum (1300 A to 1760 A). The necessary dissociative vacuum ultraviolet flux is supplied from a cylindrical, xenon, plasma source which surrounds a sapphire walled absorption cell. The pressure, annular thickness and length of the xenon plasma is variable. Analysis indicates that an oxygen atom concentration in excess of 90% can be achieved under steady operating conditions. The cell is constructed to be compatible with McPherson vacuum monochromators.

Author (GRA)

07 COMMUNICATIONS

Includes communications equipment and techniques; noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.

N72-32169* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SINGLY-CURVED REFLECTOR FOR USE IN HIGH-GAIN ANTENNAS Patent
Arthur C. Ludwig, inventor (to NASA) Issued 25 Jul. 1972 6 p Filed 5 Feb. 1971 Supersedes N72-10152 (10 - 01, p 0024) Sponsored by NASA
(NASA-Case-NPO-11361; US-Patent-3,680,144; US-Patent-Appl-SN-112988; US-Patent-Class-343-781; US-Patent-Class-343-837; US-Patent-Class-343-840; US-Patent-Class-343-915) Avail: US Patent Office CSCL 09D

A furlable antenna particularly suited for use aboard spacecraft is described. The antenna is characterized by a reflector plate conforming to a frusto-conical configuration combined with a point source feed and a secondary reflector with a reflective surface conforming to a figure of revolution (generated by rotating a segment of a parabola about an axis parallel to the ray path of the intermediate rays). The antenna can be stowed in a furled configuration without substantially reducing its efficiency. Official Gazette of the U.S. Patent Office

N72-32170 British Broadcasting Corp., Kingswood (England). Research Dept.
LOUDSPEAKER DISTORTION ASSOCIATED WITH LOW-FREQUENCY SIGNALS
H. D. Harwood Jul. 1972 17 p refs
(BBC-1972/25) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Three differing forms of distortion associated with low frequency signals in loudspeakers were investigated. It is shown that distortion due to the Doppler effect can be compared with that due to wow and flutter in recording machines and subjective data obtained for this purpose can be applied to loudspeakers. Generalized design limits for loudspeakers were calculated and it is seen that present BBC designs lie within these limits. Author

N72-32171 British Broadcasting Corp., Kingswood (England). Research Dept.
DIGITAL LINE-STORE STANDARDS CONVERSION: PRELIMINARY INTERPOLATION STUDY
M. A. Drewery Aug. 1972 18 p refs
(BBC-1972/28) Avail: BBC, Kingswood Warren, Tadworth, Surry, England

A description is given of a study, mainly theoretical, into the requirements for a more sophisticated interpolation system involving the use of signal contributions from more than two lines. Computer optimization techniques were used in determining the most suitable aperture shape using contributions from different numbers of successive field lines, and a block schematic diagram was derived for a proposed experimental interpolator to be used with the experimental digital line-store converter. A series of subjective tests is in hand to establish the basic interpolation parameters of a converter for service use. Author

N72-32172*# Martin Marietta Corp., Denver, Colo.
INVESTIGATE OPTIMUM WAY OF ADDING WIDEBAND CAPABILITY AND RECOMMEND A DESIGN FOR MODIFICATION OF ONE GOVERNMENT FURNISHED AM BASEBAND DEMULTIPLEXER, PHASE 1 Final Study Report
Apr. 1972 44 p refs
(Contract NAS8-29039)
(NASA-CR-123825; MCR-72-198) Avail: NTIS HC $4.25 CSCL 17B

The effort to analyze and test the Teledyne/Adcom model G-146 demultiplexer to determine the feasibility and optimum method(s) for modifying the unit for broadband operation is described. The desired bandwidths under consideration included 2, 4, and 8 kHz for double sideband and quadrature double sideband, and 4, 8, and 16 kHz for single sideband. Author

N72-32173*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RADIO ASTRONOMY EXPLORER B ANTENNA ASPECT PROCESSOR
Warner H. Miller, Joseph Novello, and Charles C. Reeves Jul. 1972 20 p refs
(NASA-TM-X-66032; X-734-72-344) Avail: NTIS HC $3.00 CSCL 17B

The antenna aspect system used on the Radio Astronomy Explorer B spacecraft is described. This system consists of two facsimile cameras, a data encoder, and a data processor. Emphasis is placed on the discussion of the data processor, which contains a data compressor and a source encoder. With this compression scheme a compression ratio of 8 is achieved on a typical line of camera data. These compressed data are then convolutionally encoded. Author

N72-32174*# Midwest Research Inst., Kansas City, Mo.
ECONOMIC IMPACT OF STIMULATED TECHNOLOGICAL ACTIVITY. PART 2: CASE STUDY, TECHNOLOGICAL PROGRESS AND COMMERCIALIZATION OF COMMUNICATIONS SATELLITES Final Report, 7 Apr. 1970 - 15 Oct. 1971
15 Oct. 1971 36 p
(Contract NASw-2030; MRI Proj. 3430-D)
(NASA-CR-128199) Avail: NTIS HC $4.00 CSCL 17B

The economic impact of technological progress in communications satellites is considered, as well as how these impacts affect the firms involved. Influences, if any, on the three major inputs of a nation's economic output (capital, labor, and technology) is discussed. Author

N72-32175# Joint Publications Research Service, Arlington, Va.
OVER-THE-HORIZON RADAR
Yu. A. Mishchenko 30 Aug. 1972 76 p refs Transl. into ENGLISH of "Zagorizontnaya Radiolokatsiya" Moscow, Military Publishing House, Min. of Defense USSR, 1972 96 p
(JPRS-56925) Avail: NTIS HC $6.00

The physical principles of over-the-horizon radar are considered. The characteristics of the earth's ionosphere which, according to foreign data, govern the important parameters of over-the-horizon radar, are stated: target detection zone, range and angular coordinate measurement accuracy, etc. Certain over-the-horizon radar assemblies and systems developed abroad are described briefly. Author

N72-32176# Communications Research Centre, Ottawa (Ontario). Satellite Communications systems directorate.
A STUDY OF LOW-NOISE WIDE DYNAMIC RANGE RADIO FREQUENCY FRONT END AMPLIFIERS
R. J. Bonnycastle Dec. 1971 51 p refs
(CRC-1220) Avail: NTIS HC $4.75

A summary is presented of an investigation of solid-state RF amplifier design in the frequency range .01 to 20 MHz. These amplifiers, which must be broadband, were to be used as RF stages in a spacecraft receiver system to detect very weak signals in the presence of strong interfering signals from ground-based transmitters. The interfering signals can mix in the RF amplifier, if it is not perfectly linear, to produce spurious signals, some of which may be at the frequency the receiver is tuned to. The theory of noise and distortion is considered. Measurement problems and the effect of the antenna and other elements on RF amplifier performance are also discussed. Other approaches to wide dynamic range receiver design are considered as well. Author

N72-32177*# Teledyne ADCOM, Cambridge, Mass.
MULTIPATH ERROR IN RANGE RATE MEASUREMENT BY PLL-TRANSPONDER/GRARR/TDRS
Sung J. Sohn Jul. 1970 15 p refs
(Contract NAS5-10797)
(NASA-CR-130054; G-161-4) Avail: NTIS HC $3.00 CSCL 17B

Range rate errors due to specular and diffuse multipath are calculated for a tracking and data relay satellite (TDRS) using an S band Goddard range and range rate (GRARR) system modified with a phase-locked loop transponder. Carrier signal processing in the coherent turn-around transponder and the GRARR receiver is taken into account. The root-mean-square (rms) range rate error was computed for the GRARR Doppler extractor and N-cycle count range rate measurement. Curves of worst-case range rate error are presented as a function of grazing angle at the reflection point. At very low grazing angles specular scattering predominates over diffuse scattering as expected, whereas for grazing angles greater than approximately 15 deg, the diffuse multipath predominates. The range rate errors at different low orbit altutudes peaked between 5 and 10 deg grazing angles. Author

N72-32178*# Teledyne ADCOM, Cambridge, Mass.
MULTIPATH SIGNAL MODEL DEVELOPMENT Final Summary Report
Ahmad F. Ghais and Richard H. Wachsman Nov. 1970 39 p refs
(Contract NAS5-10797)
(NASA-CR-130055; G-161F) Avail: NTIS HC $4.00 CSCL 17B

The development and use of mathematical models of signals received through the multipath environmental of a TDRS-to-user spacecraft link and vice versa are discussed. The TDRS (tracking and data relay satellite) will be in synchronous orbit. The user spacecraft will be in a low altitude orbit between 200 and 4000 km. Author

N72-32179*# Teledyne ADCOM, Cambridge, Mass.
MULTIPATH PERFORMANCE OF A TDRS SYSTEM EMPLOYING WIDEBAND FM VHF SIGNALS
Sung J. Sohn and Ahmad F. Ghais 26 Dec. 1969 31 p
(Contract NAS5-10797)
(NASA-CR-122481; G-161-2) Avail: NTIS HC $3.75 CSCL 17B

An approximate theoretical analysis is presented for the effects of specular reflection multipath on the performance of a one-way tracking and data relay satellite-to-user link. The analysis pertains to the wideband FM system employing a sinusoidal subcarrier to achieve spectrum spreading. Bounds on multipath effects are derived for receivers with and without limiters and for data modulated on the carrier or the subcarrier. For data modulation, performance is evaluated in terms of an additive lowpass signal at the data detection filter. Doppler and range tracking performance is evaluated in terms of root-mean-square (RMS) error of carrier frequency in a carrier PLL and rms phase jitter in a subcarrier PLL. Author

N72-32180*# Teledyne ADCOM, Cambridge, Mass.
MODIFICATIONS OF THE WIDEBAND FM TDRS SYSTEM
Richard H. Wachsman 23 Apr. 1970 29 p
(Contract NAS5-10797)
(NASA-CR-130057; G-161-9) Avail: NTIS HC $3.50 CSCL 17B

The wideband FM scheme for the Tracking and Data Relay Satellite (TDRS) system is discussed. The technique achieves a spread-spectrum advantage against multipath and interference through the inclusion of a large deviation FM subcarrier. The signal also permits co-channel spread-spectrum multipath access (SSMA) on the downlink from mission spacecraft to TDRS. Each user is assigned a unique combination of carrier and subcarrier which allows the ground receiver to separate user signals with overlapping spectra. The system was modified by the addition of a low-deviation fine range tone to both the uplink and the downlink, separate from the wide-deviation subcarrier. The magnitude of the interference components due to other SSMA signals are analyzed. A carrier and subcarrier frequency plan was worked out based on the modified signal format. A configuration to accommodate 42 and 60 users is described. The inclusion of ambiguity resolving ranging sidetones is also discussed. Author

N72-32181*# Teledyne ADCOM, Cambridge, Mass.
MULTIPATH ERRORS IN RANGE RATE MEASUREMENT BY A TDRS/VHF - GRARR
Sung J. Sohn Jul. 1970 12 p ref
(Contract NAS5-10797)
(NASA-CR-130056; G-161-5) Avail: NTIS HC $3.00 CSCL 17B

Range rate errors due to multipath reflection are calculated for a tracking and data relay satellite system using the VHF Goddard range and range rate (GRARR) system. At VHF the reflection is primarily specular, and the strength of the multipath relative to the direct path can be modeled in terms of the geometry and the surface characteristics, specifically the root-mean-square (rms) ocean wave height. The uplink and downlink multipath introduces phase jitter on the GRARR carrier and subcarrier. The derivation of these effects is reviewed leading to an expression for the rms range rate error. The derivation assumed the worst-case orbital configurations in which there was very little relative specular Doppler. This means that the specular multipath interference was not attenuated by the carrier and subcarrier PLL transfer functions. Curves of range rate error are presented as a function of grazing angle with wave height 0.3 to 0.7 meters and spacecraft altitude 100 to 700 miles as parameters. Author

N72-32182*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE
G. F. Hein and S. M. Stevenson [1972] 60 p refs
(NASA-TM-X-68135; E-7137) Avail: NTIS HC $5.00 CSCL 17B

Various types of weather communications are required to alert industries and the general public about the impending occurrence of tornados, hurricanes, snowstorms, floods, etc. A natural disaster warning satellite system has been proposed for meeting the communications requirements of the National Oceanic and Atmospheric Administration. Message traffic for a communications satellite was simulated with a digital computer in order to determine the number of communications channels to meet system requirements. Poisson inputs are used for arrivals and an exponential distribution is used for service. Author

N72-32183# Federal Aviation Administration, Washington, D.C.
REPORT ON LIVE TEST OF A CATHODE-RAY TUBE (CRT) TERMINAL AS AN M-28 TELETYPE REPLACEMENT
May 1972 19 p
(AT-7330-OT) Avail: NTIS HC $3.00

Benefits are examined which can be gained from the use of ASCII terminals in air traffic control teletypewriter operations. The experiment covered 60 days of on-circuit testing. Attention was focused on message functions associated with preparation (formatting and editing) and queueing (message storage prior to transmission). K.P.D.

N72-32184*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE 136 MHz/400 MHz EARTH STATION ANTENNA-NOISE TEMPERATURE PREDICTION PROGRAM FOR RAE-B
Ralph E. Taylor, Joseph J. Fee (Wolf Research and Development Corp., Riverdale, Md.), and M. Chin (Wolf Research and Development Corp., Riverdale, Md.) Sep. 1972 78 p refs Prepared by Wolf Research and Development Corp., Riverdale, Md.
(NASA-TM-X-66047; X-752-72-324) Avail: NTIS HC $6.00 CSCL 09C

A simulation study was undertaken to determine the 136 MHz and 400 MHz noise temperature of the ground network antennas which will track the RAE-B satellite during data transmission periods. Since the noise temperature of the antenna effectively sets the signal-to-noise ratio of the received signal, a knowledge of SNR will be helpful in locating the optimum time windows for data transmission during low noise periods. Antenna noise temperatures will be predicted for selected earth-based ground stations which will support RAE-B. Telemetry data acquisition will be at 400 MHz; tracking support at 136 MHz will be provided by the Goddard Range and Range Rate (RARR) stations. The antenna-noise temperature predictions will include the effects of galactic-brightness temperature, the sun, and the brightest radio stars. Predictions will cover the ten-month period from March 1, 1973 to December 31, 1973. Author

N72-32185*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROPAGATION OF RADIO WAVES THROUGH THE LOWER ATMOSPHERE OF VENUS
Kurt R. Richter Aug. 1972 31 p refs Submitted for publication
(NASA-TM-X-66046; X-730-72-323) Avail: NTIS HC $3.75 CSCL 17B

A simplified model of the Venus atmosphere is developed providing the loss factor profile of the atmosphere. With this profile the atmospheric attenuation as it depends upon the incidence angle is calculated for wavelengths between 2 cm and 20 cm. It is shown that the signal-to-noise ratios for a real aperture radar, a synthetic aperture radar, and communication links between a satellite and a landing probe achieve maximum values by the proper choice of the wavelengths. Furthermore, it turns out that the wavelength dependence is less crucial for the synthetic aperture radar compared to the other cases. Author

N72-32186# Joint Publications Research Service, Arlington, Va.
GENERAL PURPOSE MODULAR WAVEGUIDE ASSEMBLY
A. V. Kislyakovskiy, N. G. Vodopyanov, and S. N. Kushch 26 Sep. 1972 11 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (USSR), v. 14, no. 10, 1971 p 1130-1136
(JPRS-57102) Avail: NTIS HC $3.00

The design of a general purpose modular waveguide assembly consisting of orthogonally intersecting transmission lines coupled by two ferrite resonators is described. The construction allows one design version to serve as a directional bandpass filter, filter limiter, rejector filter, filter circulator, and selective attenuator. The engineering specifications for these functional elements are given. Author

N72-32187# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
STUDY AND DEVELOPMENT OF MAGNETIC RECORDING HEADS: A THIN FILM INTEGRATED MAGNETIC HEAD Ph.D. Thesis - Grenoble Univ.
Jean-Pierre Lazzari Feb. 1972 128 p refs In FRENCH
(CEA-R-4164) Avail: AEC Depository Libraries

The geometric arrangement, functions, principle characteristics, and materials used to develop a thin film integrated magnetic recording head are presented. Prototype performance and a method by which the performance can be calculated are included. Some advantages and disadvantages of the system over conventional systems are listed. Transl. by E.H.W.

N72-32188# Defence Research Information Centre, Orpington (England).
TARGET CONDUCTANCE AND VIDICON RESOLUTION
N. A. Solop and O. V. Gafaizen Apr. 1972 7 p refs Transl. into ENGLISH from Tekh. Kino Telev. (Moscow), no. 12, 1971 p 50-51
(AD-740637; DRIC-Trans-2759; BR30134) Avail: NTIS CSCL 17/2

In the past Vidicons, intended for use in broadcasting and applied television systems have often been employed as storage devices. Definition of the spread of charge over the surface of the target owing to its cross-sectional, volumetric and surface conductance takes on a considerable role in the analysis of Vidicon resolution. Distortion by the Vidicon target of the charge pattern under the combined effects of conductance of the lateral and longitudinal components of the photosemiconductive layer is examined. It is proposed that the charge contour is carried to the Vidicon target either by means of electrical recording or by pulse illumination. GRA

N72-32189# Lincoln Lab., Mass. Inst. of Tech., Lexington.
BACKSCATTER FROM A MOVING TARGET IN A RANDOMLY FLUCTUATING SLAB APPLICATION TO A VEGETATED ENVIRONMENT
Shalom Rosenbaum 28 Apr. 1972 47 p refs
(Contract F19628-70-C-0230; ARPA Order 1559)
(AD-744049; TN-1972-2; ESD-TR-72-103) Avail: NTIS CSCL 17/9

The stochastic nature of the target return depends on numerous factors: the spatial randomness of the forest's EM parameters, their temporal fluctuations, the target size and its state of motion. Attention is focused upon the calculation of the mean power and the temporal spectrum of the target return, quantities of direct and obvious relevance. The spectral modifications are traceable to two first order factors: (1) the motion of the scattering centers within the random vegetation slab and (2) the target motion through a randomly inhomogeneous field, with the latter likely to dominate. The analysis is carried out within the framework of the so-called distorted wave born approximation. The incoherent (random) scattering is accounted for to the order of single scatter, while coherent (background) effects such as refraction at the air-vegetation interface and ground reflections are properly considered. Author (GRA)

N72-32190# Michigan Univ., Ann Arbor. Cooley Electronics Lab.
ACOUSTIC SIGNAL PROCESSING Final Report, 1 Apr. 1960 - 31 Mar. 1970
Jun. 1972 63 p refs
(Contract Nonr-1224(36); NR Proj. 187-200)
(AD-744024; Rept-036740-F) Avail: NTIS CSCL 09/4

The report summarizes the theoretical and practical work performed under the contract. During the early part of the contract, primary emphasis was placed on contributions to the classical theory of signal detectability. The second period of the contract was devoted to modern signal detection theory with significant results obtained in the strategy of employing adaptive receivers. The last period of the contract was characterized by increasing emphasis on applications of theory to actual test

situations. The areas investigated were prediction of channel parameters by use of a Kalman-Bucy filter and the intersymbol interference problem in binary communication channels. Several purely practical data-gathering experiments were conducted to obtain longterm statistics on fixed underwater channels.
Author (GRA)

N72-32191# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass. Data Sciences Lab.
COMPUTER AIDED EVALUATION OF RECONNAISSANCE IMAGE COMPRESSION SCHEMES USING AN ON-LINE INTERACTIVE FACILITY
John C. Mott-Smith, Floyd H. Cook, and J. M. Knight (Mitre Corp., Bedford, Mass.) 11 Feb. 1972 44 p refs Presented at the AGARD Tech. Meeting, Aerospace Telecommunications Systems, London, May 1972
(AF Proj. 4610)
(AD-743860; AFCRL-72-0115; PSRP-480) Avail: NTIS CSCL 15/7

The desire to transmit high-quality, single-frame images such as reconnaissance photographs places a severe strain on narrow-band communications channels. The problem is severe enough to warrant use of complex and expensive compression methods, providing they really work. The authors propose a method of evaluating compression algorithms applied to pictures, and apply it to several well-known techniques already having one or more hardware implementations. The importance of proper data management for pictorial communication is illustrated, and by implication are shown to be much more important than the data compression algorithms. Relevant to the data management proposals, some methods of improving the cosmetic quality of sparsely sampled images are shown. An interactive computer system (AFCRL's Image Analysis Facility) was used in the study. Special features of this facility are operator control of the entire process from image acquisition through final display, interactive processing, and the ready ability to explore new ideas in some depth.
Author (GRA)

N72-32192# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ATMOSPHERIC CONTRAST TRANSMISSION: APPLICATION TO THE VISUAL DETECTION AND ELECTRO-OPTICAL LOCK-ON PROBLEM M.S. Thesis
Edward Aloysius Duff Jun. 1972 96 p refs
(AD-743560; GEP/PH/72-4) Avail: NTIS CSCL 17/8

Models for the prediction of detection range are evaluated in this report. The contrast available at the eye or the electro-optical sensor is assumed to be the limiting factor. The atmosphere provides a transmission factor for the target-background contrast. A model for the prediction of contrast transmission proposed by Duntley in 1948 is examined. Duntley's work provides an analytic solution based on an equation which relates visibility to air-transmittance along an inclined path, and a table of sky-ground ratios. An improved relation for visibility is developed by the author. More realistic sky-ground ratios are obtained from calculated data and from flight tests.
Author (GRA)

N72-32193# Naval Postgraduate School, Monterey, Calif. Dept. of Electrical Engineering.
TECHNIQUES FOR SIDELOBE CANCELATION M.S. Thesis
William Joseph Scott Mar. 1972 40 p refs
(AD-743742) Avail: NTIS CSCL 20/14

The thesis presents a survey of techniques which can be used to suppress sidelobes in antenna array systems. Methods applicable to fixed arrays include direct null positioning, element spacing adjustment, perturbation of complex pattern function zeroes, and pattern synthesis. Methods applicable to signal processing arrays include performance optimization, which can also be extended to permit system self-adaptation to changing noise conditions.
Author (GRA)

N72-32194# Washington Univ., Seattle. Dept. of Electrical Engineering.
PROPAGATION AND RECEPTION OF PARTIALLY COHERENT WAVES IN RANDOM MEDIA Final Report, 15 Dec. 1968 - 14 Dec. 1971
Akira Ishimaru Dec. 1971 13 p refs
(Contract F19628-69-C-0123; AF Proj. 8682)
(AD-743833; TR-152; AFCRL-72-0036) Avail: NTIS CSCL 20/14

The final report gives a summary of all the work completed and under way under this contract covering the period from December 1968 to December 1971. The work covers a broad spectrum including temporal frequency spectra, focused beams, remote probing, multiple scattering effects, and rain attenuation.
Author (GRA)

N72-32195# Raytheon Co., Wayland, Mass. Equipment Div.
RADC IMAGERY DATA BASE Final Report
David W. Gaucher Griffiss AFB, N. Y. RADC May 1972 32 p
(Contract F30602-70-C-0165)
(AD-744088; RADC-TR-72-100) Avail: NTIS CSCL 05/2

The RADC Imagery Data Base program was accomplished to enhance, maintain and update a multisensor data base with exploitation of materials to support research and development programs. This data base consisted of a reconnaissance oriented technical document library, multisensor film library and files of associated collateral data. In addition to maintaining these resource bases, this program prepared from the data on hand end products aimed at facilitating data base operations to improve this resource. This report contains complete documentation of the work accomplished during the performance of the contract.
Author (GRA)

N72-32196# Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
RANGE LAWS FOR DISTANCE MEASURING SYSTEMS USING FREQUENCY MODULATION WITH A NONLINEAR TRIANGULAR WAVESHAPE
Leon W. Couch 28 Mar. 1972 51 p refs
(Contract DAAG39-70-C-0058; DA Proj. 1B2-62301-A-208; HDL Proj. 16114)
(AD-744483; SR-72-3) Avail: NTIS CSCL 17/9

Range laws are obtained for a distance measuring system which transmits an RF signal. The RF is frequency modulated by a nonlinear triangular waveform, the amount of nonlinearity being specified by a parameter. The nonlinearity may have desirable or undesirable effects; that is, the sidelobe level of the range response may be decreased or increased depending on the shape and amount of nonlinearity. The results of this report may be used to predict range laws of systems which have nonlinear triangular modulation. Alternately, practical nonlinear triangular waveforms may be specified which will reduce the range-law sidelobes.
Author (GRA)

N72-32197# Naval Electronics Lab. Center, San Diego, Calif. Propagation Technology Div.
EXCITATION OF THE EARTH IONOSPHERE WAVEGUIDE BY A VERTICAL DIPOLE AT SATELLITE HEIGHTS (THEORY) Interim Report
Richard A. Pappert 1 Jun. 1972 23 p refs
(AD-744241; NELC-IR-723) Avail: NTIS CSCL 20/14

Formulas for excitation of the earth-ionosphere waveguide by a vertical electric Hertzian dipole at satellite heights are developed along the lines of Budden's general theory. The formulation, based on horizontal stratification, allows in an approximate manner for a vertically inhomogeneous, anisotropic ionosphere as well as for earth curvature along the direction of propagation.
Author (GRA)

N72-32198# Naval Underwater Systems Center, Newport, R.I. Sonar Technology Dept.
UTILIZATION OF TEMPERATURE SENSITIVE LIQUID

CRYSTALS FOR THERMAL ANALYSIS AND AN APPLICATION TO TRANSDUCER INVESTIGATIONS
Roger D. Maple 30 May 1972 39 p refs
(AD-744211; NUSC-TR-4235) Avail: NTIS CSCL 17/1

Cholesteric liquid crystals, because they exhibit predictable temperature-dependent color changes, are a valuable indicator for qualitative and quantitative thermal analysis, particularly the observation of varying thermal phenomena over continuous surfaces. The properties of liquid crystals, applications, and a demonstrative experiment are described, in which liquid crystals were used to observe transient and equilibrium thermal patterns of AN/SQS-26 transducers. Author (GRA)

N72-32199# Institute for Telecommunication Sciences, Boulder, Colo. Inst. for Telecommunication Sciences.
WAVE PROPAGATION ALONG A THIN DIELECTRIC COATED WIRE BURIED IN THE EARTH
James R. Wait (NOAA) and Kenneth P. Spies 26 Jan. 1972 65 p refs
(Contract PRO-Y-71-872; AF Proj. 5635)
(AD-744078; AFCRL-72-0073; SR-56) Avail: NTIS CSCL 09/5

The article considers propagation along a thin dielectric coated wire that is parallel to the interface between two homogeneous half-spaces. The solution obtained correctly accounts for the presence of the interface provided the coating radius is small compared with the distance to the interface. The final results are simplified in form when dealing with long insulated antennas buried in the earth and operating at low frequencies. Numerical data, given in tabulated form, are provided for a representative set of conditions. Author (GRA)

N72-32200# Raytheon Co., Wayland, Mass. Equipment Development Labs.
PULSE PAIR ESTIMATION OF DOPPLER SPECTRUM PARAMETERS Final Report, 1 Feb. 1971 - 31 Jan. 1972
Herbert L. Groginsky, Aaron S. Soltes, George A. Works, and Frederick C. Benham 30 Mar. 1972 96 p refs
(Contract F19628-71-C-0126; AF Proj. 6672)
(AD-744094; AFCRL-72-0222) Avail: NTIS CSCL 17/9

The results of an expanded study and investigation of the Pulse Pair technique for estimating the first and second moments (mean and variance) of Doppler spectra for radar backscatter from atmospheric phenomena are presented. The theory is extended to include the effects of non-ideal conditions, such as noise, and experimentally verified by extensive performance tests using simulated weather signals with controllable parameters. A proposed experimental model of a real-time digital pulse pair processor is defined and compared with alternate processing techniques. Based on the encouraging results of the study, recommendations are made to carry the theory into practice; these include the construction of a real-time digital pulse pair processor with flexible characteristics to gather and reduce data for evaluation while operating with real radars, and the development of additional related theory needed to guide the experimental effort. Author (GRA)

N72-32201# Philco-Ford Corp., Willowgrove, Pa. Communications and Technical Services Div.
ALGORITHMS FOR TRANSCEIVER MODULATION AND DEMODULATION Final Technical Report, 20 Feb. 1970 - 6 Aug. 1971
Kenneth Abend, David L. Fletcher, Constantine Gamacos, and W. Andrew Wright Griffiss AFB, N. Y. RADC Jan. 1972 96 p refs
(Contract F30602-70-C-0052)
(AD-744082; RADC-TR-71-305; Rept-2580-F) Avail: NTIS CSCL 17/2

The report is devoted to the investigation of algorithms which reduce the complexity of a real-time digital processor for performing tactical transceiver functions of modulation, demodulation, frequency synthesis, heterodyning, and filtering. A minimum complexity design for a Multimode Digital Processing Transceiver was established through analytical investigations and computer simulations, and a breadboard was developed for experimental evaluation. Author (GRA)

N72-32202# Ohio State Univ., Columbus. Electroscience Lab.
COHERENT COMBINING OF ANGLE MODULATED SIGNALS USING PHASE LOCK LOOPS Interim Technical Report
C. L. Golliday, Jr. and R. J. Huff May 1972 183 p refs
(Contract F30602-69-C-0112)
(AD-744085; ESL-2738-7; ITR-7) Avail: NTIS CSCL 09/5

The use of phase-lock loops to coherently combine angle modulated signals is investigated. Emphasis is placed on determining the effect of receiver-generated noise on the performance (1) combiners in which pilot tone components of the received signals to be combined are phase-locked to a common CW reference signal and (2) combiners having a reference signal derived from the sum (combiner output) signal. When a combiner of the latter type is utilized, an arbitrary angle modulation technique can be employed. The effects of introducing hard limiters in the phase-lock loops on combiner performance are determined. Linearized combiners models are developed and conventional analysis techniques used to derive expressions relating appropriate combiner performance measures to signal and system parameters. Author (GRA)

08 COMPUTERS

Includes computer operation and programming: and data processing. For applications, see specific categories. For related information see also: 19 Mathematics.

N72-32203*# Kansas Univ., Lawrence. Space Technology Labs.
INTERPRETATION AND AUTOMATIC IMAGE ENHANCEMENT PROCESSING FACILITY Bimonthly Progress Report
R. M. Haralick, Principal Investigator, Gerry Kelly, and K. Shanmugam 30 Sep. 1972 2 p Sponsored by NASA
(E72-10125; NASA-CR-128179) Avail: NTIS HC $3.00 CSCL 09B

There are no author-identified significant results in this report.

N72-32204# North Carolina Science and Technology Research Center, Research Triangle Park.
A STUDY OF COMPUTER TERMINALS FOR INFORMATION RETRIEVAL APPLICATIONS
W. Wayne Stargardt Jul. 1972 54 p
(TR-126) Avail: NTIS HC $4.75

A collection of relevant facts is presented about available computer terminals having application to information retrieval systems. Computer terminals are identified and compared which can be economically interfaced with existing computer communications controllers and software. Progress anticipated for this field within the next few years is discussed. Author

N72-32205*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN APPLICATION OF INTERACTIVE GRAPHICS TO NEUTRON SPECTROMETRY
Stephen E. Binney Sep. 1972 24 p refs
(NASA-TM-X-68062; E-6934) Avail: NTIS HC $3.25 CSCL 09B

The use of interactive graphics is presented as an attractive method for performing multi-parameter data analysis of proton recoil distributions to determine neutron spectra. Interactive graphics allows the user to view results on-line as the program is running and to maintain maximum control over the path along which the calculation will proceed. Other advantages include less

time to obtain results and freedom from handling paper tapes and IBM cards. Author

N72-32206*# Linkabit Corp., San Diego, Calif.
HYBRID CODING SYSTEMS STUDY Final Report
Joseph P. Odenwalder, Klein S. Gilhousen, Jerrold A. Heller, Irwin Mark Jacobs, Fred Jelinek, and Andrew J. Viterbi Sep. 1972 139 p refs
(Contract NAS2-6722)
(NASA-CR-114486) Avail: NTIS HC $9.00 CSCL 09B

The state of efficiency improvement available with high speed decoders presently in operation or under development is summarized. The required ratio of bit-energy-to-noise-density is given in each case for bit error probabilities. Author

N72-32207*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A CHARACTER STRING SCANNER
Richard L. Enison Jan. 1971 37 p refs
(NASA-TM-X-66033; X-552-71-58) Avail: NTIS HC $4.00 CSCL 09B

A computer program called Character String Scanner (CSS), is presented. It is designed to search a data set for any specified group of characters and then to flag this group. The output of the CSS program is a listing of the data set being searched with the specified group of characters being flagged by asterisks. Therefore, one may readily identify specific keywords, groups of keywords or specified lines of code internal to a computer program, in a program output, or in any other specific data set. Possible applications of this program include the automatic scan of an output data set for pertinent keyword data, the editing of a program to change the appearance of a certain word or group of words, and the conversion of a set of code to a different set of code. Author

N72-32208# Joint Publications Research Service, Arlington, Va.
CONFERENCE ON AUTOMATION OF SCIENTIFIC RESEARCH THROUGH THE USE OF COMPUTERS
14 Sep. 1972 12 p refs Transl. into ENGLISH from Russian conf. papers Conf. held in Novosibirsk, 5-9 Jun. 1972
(JPRS-57027) Avail: NTIS HC $3.00

A bibliography of selections are presented from papers read at the conference on automation of scientific research through the use of computers, held 5 to 9 June 1972 in Novosibirsk. Author

N72-32209*# Agnew Tech-Tran, Woodland Hills, Calif.
COMBINATORIAL CODING FOR DISCRETE STATIONARY SOURCES
Yu. M. Shtarkov and V. G. Babkin Washington NASA Mar. 1972 30 p refs Transl. into ENGLISH of Russian rept. PR-67 Moscow, Acad. Sci. Inst. Space Res., 1971 Prepared for JPL
(Contract NAS7-100)
(NASA-TT-F-14484; PR-67) Avail: NTIS HC $3.50 CSCL 09D

A method of nonuniform coding is suggested. The set of messages is divided into nonintersecting classes. Prefix codes are used to describe the classes and the messages within each class. The complete code combination of a message is formed by a successive recording of code combinations of a class and the message within the class. Author

N72-32210# RAND Corp., Santa Monica, Calif.
APPROACHES TO IMPROVED PROGRAM VALIDATION THROUGH PROGRAMMING LANGUAGE DESIGN
Donald W. Kosy Jul. 1972 26 p refs
(P-4865) Avail: NTIS HC $3.50

The relation between the language in which a program is written and the ease and efficiency of making sure that program is correct is explored. Working definitions for such overadaptive phrases as validity, testing, language design, are provided. After a brief survey of features found in current language design that assist in program checkout, their utility for program validation are assessed. A view of designing languages is proposed emphasizing the ability to help create correct programs. Some examples illustrating this approach are given and a measure of its utility is suggested. Author

N72-32211*# General Electric Co., Houston, Tex. Space Div.
FAULT TOLERANT DATA MANAGEMENT SYSTEM Final Report
W. M. Gustin and M. A. Smither 17 Oct. 1972 98 p refs
(Contract NAS9-11655)
(NASA-CR-128553; MA-129TB) Avail: NTIS HC $7.00 CSCL 09B

Described in detail are: (1) results obtained in modifying the onboard data management system software to a multiprocessor fault tolerant system; (2) a functional description of the prototype buffer I/O units; (3) description of modification to the ACADC and stimuli generating unit of the DTS; and (4) summaries and conclusions on techniques implemented in the rack and prototype buffers. Also documented is the work done in investigating techniques of high speed (5 Mbps) digital data transmission in the data bus environment. The application considered is a multiport data bus operating with the following constraints: no preferred stations; random bus access by all stations; all stations equally likely to source or sink data; no limit to the number of stations along the bus; no branching of the bus; and no restriction on station placement along the bus. Author

N72-32212*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RELABELING OF FINITE ELEMENT MESHES USING A RANDOM PROCESS
Ernest Roberts, Jr. Washington Oct. 1972 23 p refs
(NASA-TM-X-2660; E-7001) Avail: NTIS HC $3.00 CSCL 09B

An algorithm is presented to relabel automatically the nodes of an arbitrary finite-element mesh. The purpose of such relabeling is to reduce the bandwidth of the master stiffness matrix produced by the finite-element method. The algorithm uses a random process for the relabeling. Computing time is reduced substantially, compared to systematic methods. Author

N72-32213*# National Aeronautics and Space Administration, Washington, D.C.
THE DIGITAL RECORDING SYSTEM OF THE AIR-SHOWER EXPERIMENT IN KIEL
E. Boehm, U. J. Roose, R. Staubert, and J. Truemper Jun. 1972 13 p refs Transl. into ENGLISH from Nucl. Instr. Methods (Amsterdam), v. 40, 1966 p 67-72
(NASA-TT-F-14433) Avail: NTIS HC $3.00 CSCL 09B

If a large number of events must be recorded during experiments, the incorporation of manual methods at some point in data processing is a time consuming make-shift. Accordingly, in planning the air shower experiment at Kiel, optimum automation of the recording and data processing was provided a priori. The electronic equipment for processing the scintillation-counter pulses is described. A unique type of dynode gate is utilized which eliminates disturbances by noise and sequential impulses. Author

N72-32214# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FERRITE DIODE SHIFT REGISTER WITH DATA REGENERATION
Ya. D. Byalyuk 6 Apr. 1972 10 p Transl. into ENGLISH from Mekh. i Automatiz. Upr. (USSR), no. 1, 1970 p 59-60
(AD-744156; FTD-HT-23-1250-71) Avail: NTIS CSCL 09/2

A ferrite diode shift register is described which allows data regeneration for computation. Author (GRA)

N72-32215# Hamilton Standard, Windsor Locks, Conn.
RASTER PLOTTER SOFTWARE. VOLUME 1: TECHNICAL REPORT Final Report
Rodney T. Boorse, David L. Sharp, and Gerald L. Sperber Griffiss AFB, N. Y. RADC Jan. 1972 79 p refs
(Contract F30602-71-C-0107)
(AD-740605; H-SER-5924-Vol-1; RADC-TR-72-2-Vol-1) Avail: NTIS CSCL 08/2

A color coding scheme for hierarchically representing the cartographic symbology associated with JOG series 1501-A charts was developed and implemented at the RADC Experimental Cartographic Facility (ECF). The scheme employs a three level hierarchy, with up to ten colors available for each level of the hierarchy. Based on this color coding scheme, computer programs which accomplish the necessary recognition and interpretation of these color codes were developed and demonstrated. Color tagged raster data recorded by the RADC Automatic Color Scanning Device comprised the input to these programs, while the output comprised lineal data fully annotated in accordance with the prescribed code structure. In this process, separate scannings are required for the base manufacture and the coded overlay. Author (GRA)

N72-32216# Corporation for Information Systems Research and Development (CIRAD), Claremont, Calif.
SPACE PROGRAMMING LANGUAGE MACHINE ARCHITECTURE STUDY, VOLUME 1 Final Report, Feb. 1971 - Apr. 1972
A. Grebert, F. Gerbstadt, and P. Colen 30 Apr. 1972 277 p refs Prepared in cooperation with SIA, Inc., Glenmore, Pa. 2 Vol.
(Contract F04701-71-C-0200; AF Proj. 672A)
(AD-743014; CIRAD-WS-10300-2-Vol-1; SAMSO-TR-72-117-Vol-1) Avail: NTIS CSCL 09/2

The report presents the results of the Space Programming Language Machine (SPLM) Architecture Study. The principle objective of this work was to develop a computer architecture for the space, ballistic and avionic application area which directly executes a higher order language. The principle document of the design, the Semantic Simulator; the description of the SPLM language (SPIML) and its Translator/Compactor; and the memory reduction realized with the design are presented. All software for this effort was developed utilizing an interactive APL system. Author (GRA)

N72-32217# Corporation for Information Systems Research and Development (CIRAD), Claremont, Calif.
SPACE PROGRAMMING LANGUAGE MACHINE ARCHITECTURE STUDY. VOLUME 2: APPENDICES Final Report, Feb. 1971 - Apr. 1972
A. Grebert, F. Gerbstadt, and P. Colen 30 Apr. 1972 147 p refs Prepared in cooperation with SIA, Inc., Glenmore, Pa. 2 Vol.
(Contract F04701-71-C-0200; AF Proj. 672A)
(AD-743015; CIRAD-WS-10300-2-Vol-2; SAMSO-TR-72-117-Vol-2) Avail: NTIS CSCL 09/2

The appendix for the space programming language demonstrates, on a relatively simple example, the techniques used to design the far more sophisticated SPLM. The TOY is not a subset of SPLML. It is strongly recommended that the reader who is not familiar with the SPLM design project, read this document carefully. Author (GRA)

N72-32218# Honeywell, Inc., West Covina, Calif. Marine Systems Center.
TACTICAL DATA CONVERTER Final Report, Aug. 1970 - Dec. 1971
Arthur W. Brown Griffiss AFB, N. Y. RADC May 1972 130 p
(Contract F30602-71-C-0009)
(AD-744086; TD-522-72) Avail: NTIS CSCL 09/5

The report documents the design decisions, and trade-off analysis utilized during the design, fabrication and test of the Tactical Digital to Video Converter. The converter operates in the 1000 TV line raster mode to present computer generated alphanumeric, symbolic and line drawn data. It contains internal hardware character and vector generators, as well as a general purpose computer interface. The unit was designed and tested for shock, vibration and temperature encountered in tactical and airborne environments. Strong emphasis was placed upon use of MSI circuits and available qualified memory systems. A reliability, maintainability and EMI analysis was performed to insure proper operation within an operational system. Author (GRA)

N72-32219# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PLAN AND ANALYSIS OF BINARY SYNCHRONOUS COUNTING CIRCUITS
F. Mueller 4 Apr. 1972 15 p refs Transl. into ENGLISH from Nachrichtentechnik (East Ger.), v. 21, no. 2, 1971 p 51-53
(AD-744269; FTD-HT-23-1366-71) Avail: NTIS CSCL 09/2

The article reviews the basic principle of synchronous counters, which are a special case of autonomous sequential switching circuits. The design of such counters requires a minimization of combinatorial networks with several inputs and several outputs. A three-step procedure is shown by which a binary counter can be designed with JK-type flip-flops, rather than with D-Type flip-flops, to yield the simplest circuits. The procedure involves the use of Karnaugh maps and state tables. Coding and truth table are also shown. The performance is analyzed by means of state diagrams containing nodes and arrows appropriately related. Author (GRA)

N72-32869* National Aeronautics and Space Administration, Washington, D.C.
NASTRAN: DISSEMINATION EXPERIENCES AND USER BENEFITS
Joseph M. Carlson *In its* NASTRAN: Users' Experiences Sep. 1972 p 13-14 (For availability see N72-32867 23-32)
CSCL 09B

N72-32870* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TECHNICAL AND SOCIAL IMPACT OF NASTRAN
Thomas G. Butler *In its* NASTRAN: Users' Experiences Sep. 1972 p 15-27 (For availability see N72-32867 23-32)
CSCL 09B

N72-32890* Computer Sciences Corp., El Segundo, Calif.
MODIFICATIONS AND ADDITIONS TO NASTRAN AT MARSHALL SPACE FLIGHT CENTER, 1969 - 1972
Archie J. Jordon, Jr. and William G. Ward *In* NASA. Langley Res. Center NASTRAN: Users' Experiences (For availability see N72-32867 23-32)
CSCL 09B

N72-32891* Naval Ship Research and Development Center, Washington, D.C.
THE NASTRAN CONTOUR PLOTTER
Barbara M. Kelly *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 385-397 refs (For availability see N72-32867 23-32)
CSCL 09B

N72-32892* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
NASTRAN DATA GENERATION AND MANAGEMENT USING INTERACTIVE GRAPHICS
M. Smootkatow and Barry M. Cooper *In* NASA. Langley Res. Center NASTRAN: Users' experiences Sep. 1972 p 399-406 (For availability see N72-32867 23-32)
(Contract NAS7-100)
CSCL 09B

N72-32893* Naval Ship Research and Development Center, Bethesda, Md. Computation and Mathematics Dept.
THE BANDIT COMPUTER PROGRAM FOR THE REDUCTION OF MATRIX BANDWIDTH FOR NASTRAN
Gordon C. Everstine *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 407-414 refs (For availability see N72-32867 23-32)
CSCL 09B

N72-32894* Louisiana Polytechnic Inst., Ruston.
USE OF NASTRAN AS A TEACHING AID
Michael T. Wilkinson *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 415-419 refs (For availability see N72-32867 23-32)
CSCL 09B

N72-32898* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
VIEW: A MODIFICATION OF THE RAVFAC VIEW FACTOR PROGRAM FOR USE WITH THE NASTRAN THERMAL ANALYZER
Edward F. Puccinelli and Clifton E. Jackson, Jr. *In its* NASTRAN: Users' Experiences Sep. 1972 p 455-463 refs (For availability see N72-32867 23-32)
CSCL 09B

N72-32902* Grumman Aerospace Corp., Bethpage, N.Y.
DESIGN OF NASTRAN DEMONSTRATION PROBLEMS
Alvin Levy *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 497-501 refs (For availability see N72-32867 23-32)
CSCL 09B

09 ELECTRONIC EQUIPMENT

Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors; integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

N72-32220# Australian Post Office Research Labs., Melbourne.
POWER SUPPLY TRANSIENT RESPONSE TESTER
A. J. Stevens Feb. 1972 9 p
(Rept-6655) Avail: NTIS HC $3.00

A unit was designed to control a mercury-wetted contact relay. The contacts of the relay were used to switch a noninductive resistive load on and off a regulated power supply. If an oscilloscope is connected to the output terminals of the power supply, then the voltage transient response of the supply can be obtained. The unit functioned well on a wide range of power supplies with different types of transient response.
Author

N72-32221*# General Lab. Associates, Inc., Norwich, N.Y.
SURVEY, ANALYSIS AND EVALUATION TEST ON HIGH VOLTAGE/CURRENT PULSE TRANSMISSION CABLES
James E. Dann and P. C. Ottzen 23 Apr. 1970 83 p
(Contract NAS8-21298)
(NASA-CR-123815; GLA-479) Avail: NTIS HC $6.25 CSCL 09C

A survey, analysis, and testing of available cable connector configurations were carried out in connection with transmission of high voltage/current to an exploding wire bridge. Transmission was desired at high efficiency with maximum cable flexibility, at minimum weight and size of the cable connector, with maximum cable length while maintaining applicable voltage/current pulse characteristics, and with due consideration to environmental parameters.
Author

N72-32222*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FLAT CONDUCTOR CABLE APPLICATIONS
W. Angele Mar. 1972 115 p refs
(NASA-TM-X-64672) Avail: NTIS HC $7.75 CSCL 09A

Some of the numerous applications of flat conductor cable (FCC) systems are briefly described. Both government and commercial uses were considered, with applications designated as either aerospace, military, or commercial. The number and variety of ways in which FCC is being applied and considered for future designs are illustrated.
Author

N72-32223# Royal Aircraft Establishment, Farnborough (England).
PRELIMINARY INVESTIGATION INTO THE TOLERANCE OF TRANSISTORS TO TRANSIENTS
G. Goransson Aug. 1972 41 p Transl. into ENGLISH from Res. Inst. of Natl. Defence report FOA-4-C-4379-29, 1969
(RAE-Lib-Trans-1664; FOA-4-C-4379-29) Avail: NTIS HC $4.25

The manner in which the tolerance of a transistor to voltage, current, power, and energy varies with the duration of a transient pulse input to the base, in the reverse direction, of an unloaded transistor was investigated. The investigation was conducted on four different types of transistor. The structure of the transistors is described. The test was conducted by supplying a square pulse in reverse direction to the base of the transistor, the base-emitter voltage and the base current being measured on the occurrence of catastrophic breakdown.
Author

N72-32224# Royal Aircraft Establishment, Farnborough (England).
ELECTRONIC MODULES FOR ASTRONAUTICS. PART 2: MODULES FOR THE PROCESSING OF EXPERIMENTAL DATA
K. Petermann Jul. 1972 55 p Transl. into ENGLISH of "Elektron. Bausteine fuer die Raumfahrt. Teil 2: Bausteine fuer die Aufleneitung von Messdaten" Ulm, AEG-Telefunken, Oct. 1971
(RAE-Lib-Trans-1645-Pt-2) Avail: NTIS HC $4.75

Requirements for electronic modules and assemblies needed for processing telemetry data are discussed. The operational range of the available modules covers the conversion and processing, prior to input into the telemetry transmitter, of the data, signals and measurement ratings recorded by the sensors. A module range is developed using modern technologies such as integrated semiconductors and thick film circuits. The modules are designed especially for space-flight requirements, which are of minimum power dissipation, minimum weight and volume as well as maximum reliability.
Author

N72-32225# National Bureau of Standards, Washington, D.C. Electronic Technology Div.
TESTING AND FABRICATION OF WIRE-BOND ELECTRICAL CONNECTIONS - A COMPREHENSIVE SURVEY Final Report
Harry A. Schafft Sep. 1972 130 p refs Supported by Navy and DASA
(NBS-TN-726) Avail: SOD $1.25 as C13.46:726

The fabrication and testing of wire bond electrical connections used in integrated circuits, hybrid circuits, and low power discrete semiconductor devices are surveyed. The survey is restricted to wire bond electrical connections whose wire diameter is less than 2 mils and for which the wire is bonded either by thermocompressive or ultrasonic means. Essential features of the thermocompression and ultrasonic bonding processes, fabrication procedures, and characteristics of the constituent materials of the wire bond pertinent to high reliability are presented. A review of the interaction of gold and aluminum as one of the primary failure mechanisms in wire bonds are included. Test methods are discussed with emphasis on their capabilities and limitations. The following test methods are discussed: visual inspection, pull, shear, air blast, push, ultrasonic

stress, centrifuge, mechanical shock, variable frequency vibration, vibration fatigue, short duration stress pulse, temperature cycling, thermal shock, bond interface resistance, and electrical continuity tests, noise measurement, and ultrasonic bond monitoring.
Author

N72-32226*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MODIFICATION TO THE MED AND LED SOURCE-ENCODING CIRCUITRY FOR THE IMP H AND J SPACECRAFT
Norman M. Garrahan Aug. 1972 36 p
(NASA-TM-X-66030; X-711-72-302) Avail: NTIS HC $4.00 CSCL 09E

The circuitry and fabrication changes made on the MED and LED electronics cards for the IMP H and J are reported. Except for the noted changes, the circuitry and module-matrix arrangement is essentially the same as the IMP-1 electronics cards described. In addition, analysis of the IMP-1 transmitted data indicated the desirability of incorporating additional coincident-event threshold detection levels to further discriminate between received particles.
Author

N72-32227# Bureau of Mines, Denver, Colo.
A SOLID STATE AMPLIFIER FOR THE BRIDGE CIRCUIT OF A MERCURY DETECTOR
C. Melvin Lepper [1972] 13 p refs
(RI-7676) Avail: NTIS HC $3.00

A solid-state amplifier for the bridge circuit of an atomic-absorption mercury detector is presented and described. Operational advantages over previously used circuitry include improved time and temperature stability, increased measurement accuracy, and simplified setup, calibration, and operation.
Author

N72-32228*# Radiation, Inc., Melbourne, Fla. Systems Div.
S-BAND MICROCIRCUIT POWER AMPLIFIER Final Report, Oct. 1970 - Mar. 1972
W. E. McGann Mar. 1972 36 p
(Contract NAS5-20197)
(NASA-CR-130062) Avail: NTIS HC $4.00 CSCL 09E

Research, design, development, and fabrication of a two-stage, solid-state, microcircuit power amplifier operating in the 2.25 GHz region of the S-band are summarized. Output is typically 7.0 watts for an input of approximately 400 mw. Input stage is an MSC 3001 transistor; output stage is an MSC 3005 transistor. Input VSWR is 1.4:1.0, or less. Efficiency of 33.3 percent or more is achieved. Second and third harmonic suppression is 30 db. Operating power is 28 VDC. The entire unit has a length of 3.80 inches, a width of 2.08 inches, and a height of 1.00 inch.
Author

N72-32229*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH POWER LASER APPARATUS AND SYSTEM Patent Application
John C. Evans, Jr. and Henry W. Brandhorst, Jr., inventors (to NASA) Filed 13 Sep. 1972 13 p
(NASA-Case-XLE-2529-3; US-Patent-Appl-SN-288856) Avail: NTIS HC $3.00 CSCL 09E

A rapid pulsing, high intensity, incoherent light is produced by selectively energizing a number of discharge lamps with a triggering circuit. Each lamp is connected to a capacitor, and a power supply is electrically connected to all but one of the capacitors. This last capacitor is electrically connected to a discharge lamp which is electrically connected to the triggering circuits.
NASA

N72-32230*# Poly-Scientific Div., Litton Precision Products, Inc., Blacksburg, Va. Poly-Scientific Div.
THE SYNERGISTIC EFFECTS OF SLIP RING-BRUSH DESIGN AND MATERIALS Interim Report, Dec. - Mar. 1972
N. E. Lewis and E. W. Glossbrenner May 1972 29 p refs
(Contract NAS5-21146)
(NASA-CR-130063) Avail: NTIS HC $3.50 CSCL 09A

The design, fabrication, and testing of four power slip rings for synchronous orbit application are considered. Environmental and instrumentation systems necessary for monitoring electrical noise, friction, and brush wear in air and at less than 5 X 10 to the minus 8th power torr were developed. Composite brushes consisting of silver-molybdenum disulfide-graphite and silver-niobium diselenide-graphite were employed on rings of coin silver and rhodium plate. These four contact combinations were tested during ambient condition run-in at 150 and a humidity sequence at 0.1. The first nine months of a two year vacuum test performed at 0.1 rpm were completed.
Author

N72-32231*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FLAT CONDUCTOR CABLE CONNECTORS WITH INDIVIDUALLY SEALED CONTACTS
W. Angele Aug. 1972 132 p refs Prepared by Hayes International Corp., Huntsville, Ala.
(Contract NAS8-21809)
(NASA-TM-X-64695) Avail: NTIS HC $8.75 CSCL 09A

Information is presented on flat conductor cable connectors, a series with individually sealed contacts. Data are concerned with connector historical development, design requirements, and testing and costs.
Author

N72-32232*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
GAIN CALIBRATION OF A HORN ANTENNA USING PATTERN INTEGRATION
A. C. Ludwig, J. Hardy, and R. Norman 1 Oct. 1972 32 p refs
(Contract NAS7-100)
(NASA-CR-128299; JPL-TR-32-1572) Avail: NTIS HC $3.75 CSCL 09E

Gain measurement of a horn antenna using three different techniques is discussed. The methods include a two-antenna insertion loss measurement, a pattern integration method, and a near-field measurement method. The application of the pattern integration method is considered, as well as the evaluation of the near-field gain correction factors for the horn, which are determined by a method based directly on measured data. This method involves a spherical wave expansion of the experimental radiation pattern of the specific antenna being tested, rather than evaluation of an assumed analytical model. The spherical wave expansion is also compared to experimental near-field pattern data.
Author

N72-32233# Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
FAST IDENTIFICATION ALGORITHM AND ITS APPLICATION TO THE CHARACTERIZATION OF BIPOLAR TRANSISTORS
Alain Bonnemay and Antonio Munoz May 1971 18 p refs In FRENCH Presented at Conf. on Hybride Automation and Calculation, Cadarache, France, 26-28 May 1971
(CEA-CONF-1944; Conf-710543-2) Avail: AEC Depository Libraries

A mathematical analysis is presented that elaborates on the solution of a fast algorithm by statistical minimization of nonlinear regression problems. An application of the algorithm to the determination of bipolar transistor characteristics is discussed.
Transl. by E.H.W.

N72-32234# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
CURRENT REGULATOR FOR SUPERCONDUCTING SOLENOID

Yu. F. Kiselev 1972 19 p refs In RUSSIAN
(JINR-P13-6231) Avail: AEC Depository Libraries

A compact precision current regulator for a superconducting solenoid with an automatic input-output system and fine current scanning is described. The current instability is 0.000007/h, and the current instability at the outer temperature changes is 0.000002/deg C. Author (NSA)

N72-32235# European Organization for Nuclear Research, Geneva (Switzerland).
EXPERIMENTAL RESULTS ON A FAST CYCLING PULSED HV POWER SUPPLY
A. Brueckner and A. Plunser 13 Mar. 1972 20 p refs
(CERN-72-5) Avail: AEC Depository Libraries

A fast-cycling power supply is described for recharging 20 times the one-bunch delay line of the full-aperture kicker (FAK) of the proton synchrotron. It will allow the bunch-by-bunch transfer at 10 GeV from the 28 GeV CERN proton sychrotron to the 300 GeV CERN proton sychrotron. The power supply is capable of charging a 35 nF capacity up to 60 kV. The supply offers higher performance combined with higher reliability and full timing flexibility, all this at lower cost. It needs only 20% of the stored energy foreseen in an earlier proposal. This 20-pulse supply consists principally to 10 double-triggered glass-envelope triode-thyatrons, each discharging a double capacitor into the primary winding of a premagnetized ferrite-core power pulse transformer. There are no semiconductor diodes on the HV side of the supply, as their reliability remains to be demonstrated. Performance measurements were made on a 40kVCX1154 thyratron. Author (NSA)

N72-32236# Brown Univ., Providence, R.I. Div. of Engineering.
ANALYSIS OF STRUCTURAL-ACOUSTIC INTERACTIONS IN METAL CERAMIC TRANSDUCERS
W. John Denkmann, Robert E. Nickell, and David C. Stickler Apr. 1972 33 p refs
(Contract N00014-67-A-0191-0007)
(AD-743985; TR-10) Avail: NTIS CSCL 09/1

The influence of a (a) coupling between flexural and extensional deformation and (b) coupling between structure and acoustic volume on the dynamic response of piezoelectric ceramic transducer elements mounted on metal diaphragms is analyzed using three analytical methods: (1) classical boundary value techniques; (2) simple direct variational procedures; and (3) finite element methods. The analyses are able to predict the voltage output of the transducer, including resonant amplitudes and shapes, with reasonable accuracy and, also, indicate critical front and back acoustic volume design parameters needed to control resonance. The finite element model includes a general formulation for axisymmetric, layered shells of revolution (which degenerates to a circular plate), whose average normal displacement is coupled to the long-wavelength motion of air in adjacent cavities (acoustic stiffness), ports (acoustic mass), and porous plugs (acoustic damping). The methods outlined here are also applicable to window-enclosure response to sonic boom excitation and to skull-brain impact studies. Author (GRA)

N72-32237# Westinghouse Electric Corp., Baltimore, Md. Systems Development Div.
BINARY ADDRESSABLE SCAN-CONVERSION STORAGE TUBE Quarterly Report, 15 Oct. 1971 - 14 Jan. 1972
Dickron Mergerian, Jon W. Ogland, Haden J. Bourg, and Igor Limansky Feb. 1972 46 p refs
(Contract DAAB07-72-0052)
(AD-742521; ECOM-C-0052-1; QR-1) Avail: NTIS CSCL 09/1

The objective of the contract is to conduct a research and development program leading to the fabrication, testing, and delivery of a binary-addressable scan-converter storage tube. The tube is to be capable of simultaneous write and non-destructive read operation at video frequency up to 10 megahertz. An electron optical analysis of the beam-focusing within the digitizer matrix was performed for the purpose of most effectively controlling the flow of write-electrons to the storage-target and at the same time conserving digitizer drive-power. Author (GRA)

N72-32238# Chu Associates, Littleton, Mass.
SPHERICAL REFLECTOR TRANSVERSE FEED SYSTEM Final Report, 3 May 1968 - 31 Jan. 1971
Ivan M. Faigen and Ahmet Ergene Jan. 1972 91 p refs
(Contract F19628-68-C-0243)
(AD-744064; AFCRL-72-0095) Avail: NTIS CSCL 09/1

A corrective transverse feed system for spherical reflectors was developed to correct spherical aberrations and provide improved aperture efficiencies over a scan plus or minus 30 degrees. A review of prior work on spherical reflector focal region field analysis was conducted. Numerical integration procedures for the scattered fields in the focal region were developed both for the receive and for the transmit feed approach. Corrected transverse feed systems were designed and fabricated for both lens and horn arrays based on these analyses. The designs were tested, corroboration with theory determined and recommendations for future work were set forth.
Author (GRA)

N72-32239# IIT Research Inst., Chicago, Ill. Reliability Analysis Center.
MICROCIRCUIT DEVICE ENVIRONMENTAL DATA
Irwin L. Krulac Apr. 1972 196 p
(Contract F30602-72-C-0183; IITRI Proj. E6221)
(AD-744018; RAC-MDED-0472) Avail: NTIS CSCL 09/5

The tabulation contains environmental test results which are organized and presented by device manufacturer and part numbers. For each entry the device function, technology, package type, screen level and manufacturing data code, in addition to the applied environmental conditions are described. Failure statistics and observed failure modes are reported. The complete compendium is reissued annually. Author (GRA)

N72-32240# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
SPECTRAL MATCHING FACTORS FOR PHOTOCATHODES PHOSPHOR SCREENS, AND PHOTOGRAPHIC EMULSIONS IN IMAGE INTENSIFIER RECORDERS USING NIGHT SKY ILLUMINATION, AND RELATED PROBLEMS Final Report
Radames K. H. Gebel, Hermann J. Spiegel, Hermann R. Mestwerdt, and Roy R. Hayslett Apr. 1972 224 p refs
(AF Proj. 7885)
(AD-744056; ARL-72-0046) Avail: NTIS CSCL 09/1

The purpose of this paper is to assess the performance of basic components of opto-electronic image recording systems using night-sky illumination. The analysis is concerned with the matching efficiency between night-sky illumination and photocathodes, between photocathodes and phosphor screens and between phosphor screens and photographic films. To preserve resolution, a cascaded opto-electronic system must employ stages with maximum gain so that a minimum number of stages is contained in the system since especially each phosphor screen contributes to the deterioration of resolution.
Author (GRA)

N72-32241# Harry Diamond Labs., Washington, D.C.
EXTERNALLY EXCITED TRANSMISSION LINE: DEFINITION OF PROCEDURES FOR DETERMINING COUPLING PARAMETERS
Sidney Frankel May 1972 21 p refs Supported by Defense Nucl. Agency
(DA Proj. 1T0-61101-a-91a; HDL Proj. E05E3)
(AD-743468; HDL-TM-72-11) Avail: NTIS CSCL 09/1

Magnetic- and electric-coupling parameters between a

multi-conductor transmission line and an external electromagnetic field are defined. An electrostatic method for determining both types of parameters is proposed. Both types of parameters require determination of the same set of constants. While the magnetic-coupling parameters are directly proportional to these constants (one constant for each conductor), the electric parameters are proportional to a linear combination of the constants, the coefficients of the linear forms being certain capacitance coefficients of the line. Author (GRA)

N72-32242# General Motors Corp., Kokomo, Ind. Delco Electronics Div.
LOW COST TRANSIENT SUPPRESSORS EXPLORATORY DEVELOPMENT Final Report, 1 Jul. 1971 - 1 Mar. 1972
J. E. Reynolds May 1972 57 p ref
(Contract DAAB07-71-C-0325)
(AD-743996; R-101; ECOM-0325-F) Avail: NTIS CSCL 09/1

Two hundred (200) prototype suppressor modules of a new design were fabricated. This new design contains the zener diode, a fuse, and an indicator lamp, in a housing which is almost identical to one end plug of the connecting cable for the previous MX-7778/GRC suppressor module. Thus, a drastic reduction in size and weight were effected while retaining essentially the same zener diode suppressing function. Author (GRA)

N72-32243# Naval Training Device Center, Orlando, Fla.
EVALUATION OF SOLID STATE IMAGE INTENSIFIER SCREEN
Windell Mohon, N. Jun. 1972 18 p refs
(AD-743956; NAVTRADEVCEN-TN-29) Avail: NTIS CSCL 09/1

An evaluation is given of an experimental photoconductive-electroluminescent image intensifier screen. A brief background is given of the development. An elementary statement of the theory of photoconductivity and electroluminescence is given. The amount of amplification, resolution, rise time, and decay time is given. A summary of results is given. Author (GRA)

N72-32244# New Mexico Univ., Albuquerque. Bureau of Engineering Research.
AN AUTOMATIC ANTENNA IMPEDANCE COMPENSATOR FOR REENTRY VEHICLES Technical Report, Jul. 1967 - Jun. 1970
John S. Potts and Edward S. Bocian, Jr. Kirtland AFB, N. Mex. AFWL Mar. 1972 228 p refs
(Contracts F29601-68-C-0089; AF 29(601)-7097; AF Proj. 5791)
(AD-743994; AFWL-TR-71-160) Avail: NTIS CSCL 09/6

The plasma sheath that surrounds a vehicle on reentry into the earth's atmosphere at hypersonic speeds is a lossy, reflective, and time varying medium. Consequently, an on-board transmitting antenna that is tuned to an acceptable VSWR before launch becomes mismatched by the plasma and heating encountered during reentry. The report presents a device which will maximize automatically the power radiated from an X-band antenna immersed in a time varying reflective medium. This device, called an automatic antenna impedance compensator, consists of a reflectometer for sensing the complex reflection coefficient of the antenna, an electronic equivalent of a slide screw tuner that employs two variable ferrite phase-shifters for maintaining a matched condition, and a feedback control circuit that processes the signals from the reflectometer for use by the electronic tuner. Author (GRA)

N72-32245# Bendix Corp., Sidney, N.Y. Electrical Components Div.
RELIABLE INTEGRATED WIRE TERMINATION DEVICES Semiannual Report, 1 Jul. - 31 Dec. 1971
D. L. Pfendler and D. H. Gould Jun. 1972 93 p refs
(Contract DAAB07-71-C-0090; DA Proj. 1F1-62203-A-119)
(AD-744476; ECOM-0090-2) Avail: NTIS CSCL 09/1

The purpose of the investigation is to cover the design and evaluation of a wire termination system capable of interconnection to a variety of multi-contact connectors such as cylindrical, rectangular rack and panel, printed circuit board, and terminal junction devices. The connective devices are to be capable of assembly and maintenance with a common tool for terminal insertion and withdrawal. In addition, the various connective devices shall be capable of reliably withstanding the environmental conditions encountered by both ground and airborne Army equipment. Primary emphasis is directed toward a significant improvement of the reliability and maintainability of wiring systems in Army aircraft. Protype test samples containing size 22D terminals have been fabricated and tested. Prototype test samples containing size 20 terminals (both metallic and dielectric retention) are being fabricated and will be evaluated according to the prepared test procedure. Terminal insertion and removal tools have been revised and will be evaluated according to a test procedure to be prepared. Author (GRA)

N72-32246# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MICROELECTRONICS IN MILITARY TECHNOLOGY
N. Orlov 7 Mar. 1972 10 p Transl. into ENGLISH from Radio (Moscow), no. 9, 1970 p 19-20
(AD-744173; FTD-HT-23-1559-71) Avail: NTIS CSCL 09/1

The report is written in answer to letters from radio amateurs asking about the impact of microelectronics on military techniques. Because the electronic equipment on rockets as well as aircraft is so bulky, various methods of miniaturization must be used. These methods, including compact mounting methods, thin film circuitry, solid state circuitry, are discussed in some detail. Included in this discussion are qualitative explanations of the construction of circuit elements in thin film and solid state devices. The subject is treated in a general way, with no hint of the type of equipment peculiar to Soviet practice. Author (GRA)

N72-32247# Army Electronics Command, Fort Monmouth, N.J.
EXPERIMENTAL INVESTIGATION OF HIGH FREQUENCY ANTENNA ARRAYS HAVING REDUCED GROUND LOSSES
D. V. Campbell May 1972 15 p refs
(AD-744469; ECOM-3573) Avail: NTIS CSCL 09/5

Compact, high frequency antennas have been combined to form efficient, closely-spaced arrays having greatly reduced ground losses. Under ideal circumstances, an array of N elements would reduce the ground loss by the factor 1/N. Experiments prove that only a small area is needed to erect an omnidirectional antenna array having significantly increased efficiency. Author (GRA)

N72-32248# Teledyne ADCOM, Cambridge, Mass.
SAMPLED DATA CHANNEL FILTERS Final Technical Report, Mar. 1971 - Feb. 1972
Steven M. Sussman Griffiss AFB, N. Y. RADC May 1972 72 p refs
(Contract F30602-71-C-0212)
(AD-744089; G-179FR; RADC-TR-72-104) Avail: NTIS CSCL 09/5

The report describes the design, development, and test results of a digital filter implementation for a single channel of an FDM group demultiplexer. The digital filter is a non-recursive type with a symmetric impulse response that produces the specified amplitude characteristics with zero delay distortion. The small amount of observed delay distortion is due to the analog pre- and post-processing filters. The report includes the preliminary design of a complete 12-channel FDM group multiplexer based on the digital processing techniques developed under this contract. Author (GRA)

N72-32249# Rome Air Development Center, Griffiss AFB, N.Y.
A DETAILED ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF AN INCLINED END FIRE RECEIVING RHOMBIC ANTENNA ARRAY Final Report, 1969 - 1970

Edward J. Christopher May 1972 96 p refs
(AD-744091; RADC-TR-72-109) Avail: NTIS CSCL 09/5

The report provides an account of a new rhombic antenna array design and the resultant effect upon the antenna pattern resulting from this design. The intent of this effort was twofold: first, to reduce the deep nulls in the vertical profile that existed with a horizontal single rhombic in order to obtain smooth vertical coverage from 2 degrees to 24 degrees in elevation; and secondly, to reduce the first sidelobe levels in the horizontal plane pattern of a single rhombic antenna. Author (GRA)

N72-32250# IBM Watson Research Center, Yorktown Heights, N.Y.
ELECTRON BEAM FABRICATION OF HIGH FREQUENCY, LOW LOSS, WIND BAND-WIDTH INTERDIGITAL ACOUSTIC SURFACE WAVE TRANSDUCERS Final Report, 1 Sep. 1969 - 29 Feb. 1972
Alec N. Broers and Michael Hatzakis 1 Apr. 1972 19 p ref
(Contract F19628-70-C-0018; AF Proj. 5635)
(AD-744092; AFCRL-72-0271) Avail: NTIS CSCL 09/1

Electron beam fabrication techniques for building surface acoustic wave transducers have been developed. Descriptions of the electron beam equipment used for writing the desired patterns and also the resist and thin film techniques used to produce the metal structures have already been reported in a previous report (February 1971). This shorter final report contains additional information on the fabrication techniques, and also a description of a digital pattern generator for transducer patterns. A complete list of devices made during the contract is included. Author (GRA)

N72-32251# New Mexico State Univ., University Park. Physical Science Lab.
RESEARCH AND DEVELOPMENT OF ANTENNAS FOR ROCKET AND SATELLITE DATA TRANSMISSION Final Report, 13 Jan. 1969 - 13 Jan. 1972
A. Waterman and Dennis G. Henry 12 Apr. 1972 12 p refs
(Contract F19628-69-C-0177; AF Proj. 7659; ILIR Proj. 5-7)
(AD-744095; PSL-PR00759; AFCRL-71-0281) Avail: NTIS CSCL 09/5

The studies included the development of telemetry and beacon antenna designs for research rockets and satellites. The most significant development was the design of a stripline integrated array for operation in the 2.2 GHz to 2.3 GHz S-band telemetry range, and the 5.5 GHz or 5.7 GHz C-band Beacon range. Summaries of the work performed are presented. Author (GRA)

N72-32252# Army Foreign Science and Technology Center, Charlottesville, Va.
LOW POWER ELECTRIC MOTORS
G. M. Aron 5 May 1972 305 p refs Transl. into ENGLISH from the book "Elektrodvigateli Maldy Moshchnosti" Leningrad, 1971 p 3-241
(AD-744510; FSTC-HT-23-1417-72) Avail: NTIS CSCL 09/3

The collection contains materials on the theory and methodology of the designing of low-power electric motors for general industrial use and specialized use. The works published in it discuss the results of investigations of induction and synchronous electric motors, collector and contactless direct-current electric motors, reduction-gear, and stepping electric motors. Recommendations are given for the designing of individual types of low-power electric motors. The results of investigations of the bearing units of electric motors with an increased service life are given. Data concerning the use of slot insulation applied by the eddy spraying method are discussed. Author (GRA)

N72-32253# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
ACOUSTIC SIGNAL PROCESSING DEVICES Semiannual Progress Report, 1 Oct. 1971 - 1 May 1972
Gordon Judd, W. R. Smith, and F. Morse May 1972 73 p refs
(Contract DAAB07-72-C-0023)
(AD-744474; FR-72-14-686; ECOM-0023-1; SAPR-1) Avail: NTIS CSCL 09/1

The objective of the program is to develop the analytical and experimental techniques required to implement phase coded filters with surface wave delay lines. The end goal of this study is to establish some useful bounds on the practicality of using surface wave devices to synthesize and decode phase coded waveforms with large time-bandwidth products. The report invludes a brief tutorial discussion of the characteristics of various types of phase codes. Emphasis is given to the trade-offs involved in selecting optimum codes for secure communication applications. The circuit model formulated to analyze the response of various tapped delay line designs is described together with an illustrative example of its use in optimizing the performance of a given design. The results of experimental work in the development of coded and uncoded delay lines made on quartz and lithium niobate substrates are presented with special attention given to the improved output response that has been achieved with a new tapping array geometry designed for use on high coupling substrates. Author (GRA)

N72-32254# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
ELECTROMAGNETIC RADIATION FROM A VIBRATING QUARTZ PLATE
R. D. Mindlin Jul. 1972 18 p refs
(Contract N00014-67-A-0027; NR Proj. 064-388)
(AD-744312; TR-23) Avail: NTIS CSCL 09/1

The linear equations of piezoelectromagnetism are solved for the case of thickness-shear vibrations of a quartz plate. For an AT-cut plate vibrating near resonance, the radiation for each face is about 25 microwatts per square centimeter for a shear strain of 10 to the minus 5th power. Author (GRA)

N72-32255# Frankford Arsenal, Philadelphia, Pa.
ANALYSIS OF THE COOK DEMODULATOR
Daniel E. Frank Jan. 1972 44 p refs
(DA Proj. 1T0-61101-A-91A)
(AD-744435; FA-R-2032) Avail: NTIS CSCL 09/5

A coherent demodulator is described. Mathematical expressions for the output and an upper bound for the distortion are derived. Some applications for the demodulator are described as well as the mathematical basis for these applications. Author (GRA)

10 ELECTRONICS

Includes circuit theory; and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories.

N72-32256 National Lending Library for Science and Technology, Boston Spa (England).
EVALUATION OF QUALITY OF LATERAL CORING DIAGRAMS
A. I. Grebennikov et al Jul. 1972 4 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Neft i Gaz (Baku), no. 4, 1968 p 16-18
(NLL-RTS-6743) Avail: Natl. Lending Library, Boston, Spa, Engl.: £0.40 or 1 NLL photocopy coupon

The quality and accuracy of data obtained during borehole investigations by an ABK-3 apparatus are discussed. The work potential of the principle units of the system under actual working conditions is evaluated. E.H.W.

N72-32257*# Stanford Univ., Calif. Center for Systems Research.
OPTIMAL INPUTS FOR SYSTEM IDENTIFICATION

Donald B. Reid May 1972 216 p refs
(Grants NGR-05-020-526; NGL-05-020-007)
(NASA-CR-128173; SU-SUDAAR-440) Avail: NTIS HC $13.00 CSCL 09B

Identification criteria are presented for linear dynamic systems with and without process noise. With process noise, the state equations are replaced by the Kalman filter equations. If the identification performance index is expanded in a Taylor's series with respect to the parameters to be identified, then maximizing the weighting factor of the quadratic term with respect to the inputs will insure that an identification algorithm will converge more rapidly and to a more accurate result than with nonoptimal inputs. The expectation of this weighting factor is the Fisher information matrix, and its inverse is a lower bound for the covariance of the parameters. Direct and indirect methods of calculating the information matrix are presented for systems with and without process noise. Author

N72-32258*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A FEEDBACK CONTROL MODEL FOR NETWORK FLOW WITH MULTIPLE PURE TIME DELAYS
Jacques Press Aug. 1972 118 p refs
(NASA-TM-X-66020; X-765-72-315) Avail: NTIS HC $7.75 CSCL 12A

A control model describing a network flow hindered by multiple pure time (or transport) delays is formulated. Feedbacks connect each desired output with a single control sector situated at the origin. The dynamic formulation invokes the use of differential difference equations. This causes the characteristic equation of the model to consist of transcendental functions instead of a common algebraic polynomial. A general graphical criterion is developed to evaluate the stability of such a problem. A digital computer simulation confirms the validity of such criterion. An optimal decision making process with multiple delays is presented. Author

N72-32259# Battelle-Northwest, Richland, Wash. Pacific Northwest Labs.
ELECTRONIC INTERFERENCE REDUCTION IN ACOUSTIC EMISSION TESTING
T. J. Davis Nov. 1971 18 p refs
(Contract AT(45-1)-1830)
(BNWL-1596) Avail: NTIS

Techniques which may be used to significantly enhance signal-to-noise ratio for acoustic emission monitoring in severe electrical environments are described. Methods for applying common mode rejection and optimizing signal shielding and grounding are presented. A new and useful approach for isolating instruments from unregulated 60 Hz power lines is also discussed. Author

N72-32260# Bell Aerospace Co., Buffalo, N.Y.
ADAPTIVE MODELING AND CONTROL Final Report, 15 Jun. 1965 - 14 Jun. 1972
Frederic D. Powell Jun. 1972 12 p refs
(Contracts Nonr-4864(00); N00014-71-C-0421; NR Proj. 049-207)
(AD-744344; Rept-9500-920249) Avail: NTIS CSCL 12/1

In a variety of situations, the parameters which define a dynamic plant are poorly known, are unknown, or may change in an unpredictable way during operation. Improved control performance can be achieved if the unknown parameter values are identified. Research conducted under these contracts studied the application of adaptive techniques to parameter identification and control of linear, nonlinear, and time-varying plants. The report outlines the research accomplished on open and closed-loop methods of parameter identification for linear plants, and for nonlinear plants using a combination of nonlinear quantizing and piecewise-linear operations. Adaptive inversion, decorrelation, orthogonalization and normalization are discussed. Adaptive control methods using a two-time-scale principle are explored. Author (GRA)

N72-32261# Institute for Telecommunication Sciences, Boulder, Colo. Inst. for Telecommunication Sciences.
THEORY OF ELECTROMAGNETIC REFLECTION FROM A PARALLEL GRID OF DIELECTRIC COATED WIRES BURIED IN THE EARTH
James R. Wait 9 Feb. 1972 24 p refs
(Contract PRO-Y-71-872; AF Proj. 5635)
(AD-744079; AFCRL-72-0134; SR-57) Avail: NTIS CSCL 09/5

Using a boundary-value treatment, a solution is obtained for the plane wave reflection from a grid of thin insulated wires buried in a homogeneous conducting half-space. A key step in the analysis is the use of an approximate impedance condition to relate the total current in the insulated grid wires and the axial component of the total electric field. Full account of the interaction of the fields with the air-ground interface is also achieved. The final result, for the specular component of the scattered field, is shown to be consistent with an equivalent transmission line circuit. The latter may also be used to predict the effect of a layer of snow or ice on the ground.
Author (GRA)

11 FACILITIES, RESEARCH AND SUPPORT

Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

N72-32262*# Alaska Univ., College.
COORDINATION AND ESTABLISHMENT OF CENTRALIZED FACILITIES AND SERVICES FOR THE UNIVERSITY OF ALASKA ERTS SURVEY OF THE ALASKAN ENVIRONMENT Bimonthly Progress Report
Albert E. Belon, Principal Investigator 30 Sep. 1972 6 p Sponsored by NASA
(E72-10139; NASA-CR-128193; BMPR-1) Avail: NTIS HC $3.00 CSCL 14B

The author has identified the following significant results. Specifications have been prepared for the engineering design and construction of a digital color display unit which will be used for automatic processing of ERTS data. The color display unit is a disk refresh memory with computer interfaced input and a color cathode ray tube output display. The system features both analog and digital post disk data manipulation and a versatile color coding device suitable for displaying not only images, but also computer generated graphics such as diagrams, maps, and overlays. Input is from IBM compatible 9 track, 800 BPI tapes, as generated by an IBM 360 computer. ERTS digital tapes are read into the 360, where various analyses such as maximum likelihood classification are performed and the results are written on a magnetic tape which is the input to the color display unit. The greatest versatility in the data manipulation area is provided by the minicomputer built into the color display unit, which is off-line from the main 360 computer. The minicomputer is able to read any line from the refresh disk and place it in its 4K-16 bit memory. Considerable flexibility is available for post-processing enhancement of images by the investigator.

N72-32263*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TRACKING OF THE ATS-3 SYNCHRONOUS SATELLITE BY THE VERY LONG BASELINE INTERFEROMETER (VLBI) TECHNIQUE
J. Ramasastry, B. Rosenbaum, R. D. Michelini (Smithsonian Astrophysical Obs.), D. Frost (Smithsonian Astrophysical Obs.), S. Ross (Ross (S.) and Co.), and A. Boornazian (Ross (S.) and Co.) Jul. 1972 134 p refs

(NASA-TM-X-66018; X-553-72-290) Avail: NTIS HC $8.75 CSCL 22C

During 1971, a series of very long baseline interferometer observations were made of the C-band (6 cm) radio signals from the ATS-3 communications satellite which is in a synchronous, near-equatorial orbit. The first series of observations were conducted during May-June 1971 from Rosman, North Carolina (NASA/ATS Station 85' dish) and Mojave, California (NASA/ATS Station, 40' dish). The second series of observations were conducted during August-September, 1971 from Rosman, North Carolina (NASA/ATS Station, 85' dish), Owens Valley, California (Cal Tech, 130' dish) and Agassiz, Massachusetts (SAO Agassiz Radio Observatory, 84' dish). The ATS-3 Spacecraft position was determined with a precision of 70-100 meters and its velocity with a precision of less than a mm/sec. The ATS-3 orbital elements were computed using the GEODYN program and the derived values are consistent with those derived from conventional tracking data. Author

N72-32264*# Scientific Translation Service, Santa Barbara, Calif.

WIND TUNNEL CORRECTIONS FOR MEASUREMENTS OF TWO-DIMENSIONAL PROFILES IN THE TRANSONIC WIND TUNNEL OF THE AERODYNAMIC TESTING FACILITY GOETTINGEN

P. Mackrodt Washington NASA Jun. 1972 16 p refs Transl. into ENGLISH from Z. Flugwiss. (Brunswick), v. 19, Nov. 1971 p 449-454

(NASA-TT-F-14316) Avail: NTIS HC $3.00 CSCL 14B

Pressure distribution measurements on an airfoil at high subsonic speed were carried out in the transonic wind tunnel of the AVA Goettingen of the DFVLR. The normal force coefficients obtained from these pressure distributions were corrected for wind tunnel interferences and compared with results of theoretical calculations. To this end the wind tunnel wall corrections for two-dimensional flow given in the literature were adapted to the special case of the transonic wind tunnel of the AVA. Author

N72-32265# Iowa Univ., Iowa City. Inst. of Hydraulic Research.

THE FIRST HALF CENTURY OF HYDRAULIC RESEARCH AT THE UNIVERSITY OF IOWA

Enzo O. Macagno, ed., David D. Moran, ed., and David W. McDougall, ed. 1971 187 p refs

(Bull-44) Avail: NTIS HC $11.50

Hydraulic projects conducted in a research facility over a fifty year period are discussed. Subjects presented include: (1) accelerated flows, (2) biomechanics, (3) density-stratified flow, (4) environmental fluid mechanics, (5) hydrology, (6) structural vibrations, (7) sediment studies, and (8) waves breakdown. Author

N72-32266# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.

BEAM MONOCHROMATIZATION BY MEANS OF RESONATOR

Hans-Ulrich Gersch 1972 20 p refs In RUSSIAN

(JINR-P9-6252) Avail: AEC Depository Libraries

A method was proposed to improve the energy spread of a pulsed accelerator beam by means of an ion-optical system consisting of an analyzer and a high-frequency resonator. The application of this method for monochromatization of a 40-MeV isochronous cyclotron beam to obtain the final energy spread was studied. With this, the available emittance of the primary beam should be as large as possible. The conditions obtained show the applicability of the method by using a resonator with the wavelength 2m which oscillates in the first and third harmonic. Author (NSA)

N72-32267# Los Alamos Scientific Lab., N.Mex.

MEDIUM-ENERGY PHYSICS PROGRAM Quarterly Status Report, period ending 31 Jan. 1972

Eleanor Dunn, comp. 31 Jan. 1972 46 p refs

(Contract W-7405-eng-36)

(LA-4899) Avail: NTIS

Topics include engineering support, accelerator systems development, electronic instrumentation and computer systems, accelerator operations, experimental area, LAMPF facility construction, physics research, theoretical physics, practical applications of LAMPF and the LAMPF users group. NSA

N72-32268# Rensselaer Polytechnic Inst., Troy, N.Y.

LINEAR ACCELERATOR PROJECT Progress Report, 1 Oct. - 31 Dec. 1971

31 Dec. 1971 57 p refs

(Contract AT(11-1)-3058)

(COO-3058-11) Avail: NTIS

The research reported for this period includes: neutron cross sections for iron minimum at 24.3 KeV, Pu-240, Pu-242, and U-238; experimental, and theoretical reactor physics; and computer development. F.O.S.

N72-32269# Office of Naval Research, London (England).

NEW SHOCK TUBE LABORATORY AT AACHEN, GERMANY

Arthur A. Ranger 9 Mar. 1972 19 p refs

(AD-741191; ONRL-R-5-72) Avail: NTIS CSCL 14/2

The report describes the new Shock Tube Laboratory of the Institut fur Allgemeine Mechanik, Technische Hochschule, Aachen, Germany. Detailed descriptions of the facilities are given together with a report on EUROMECH no. 29, a Colloquium on High Temperature Gasdynamics which was organized by Prof. Schultz-Grunow in connection with the dedication ceremonies of his new laboratory. Author (GRA)

N72-32270# Federal Aviation Administration, Washington, D.C.

MANTI-EPHRAIM AIRPORT, PROJECT 72-1-07-49-0018-01, EPHRAIM, UTAH. Final Environmental Impact Statement

27 Apr. 1972 33 p Supersedes PB-207064-D

(PB-207064-F; PB-207064-D; ELR-4333) Avail: NTIS HC $3.00 CSCL 13B

The proposed action is to improve the general aviation airport at Manti-Ephraim, Utah. The airport is located between the towns of Ephraim and Manti and some increase in noise pollution will occur as traffic increases. Infrequent usage by business jet aircraft will occur. Author

N72-32271# Federal Aviation Administration, Washington, D.C. Airports Service.

BAXLEY MUNICIPAL AIRPORT, BAXLEY, GEORGIA Final Environmental Impact Statement

14 Apr. 1972 30 p Supersedes PB-206167-D

(PB-206167-F; PB-206167-D; ELR-4227) Avail: NTIS HC $3.00 CSCL 13B

The project is to extend and widen the existing paved runway at the Baxley, Georgia, airport. There will be approximately 10 acres of clearing, slightly increased noise levels due to occasional operations of twin-engine business aircraft, slightly increased air pollution due to operation of these aircraft, and short term adverse environmental effects associated with normal construction techniques. GRA

N72-32272# Federal Aviation Administration, Washington, D.C. Airports Service.

DADE COUNTY AIRPORT, TRENTON, GEORGIA Final Environmental Impact Statement

27 Apr. 1972 49 p Supersedes PB-205578-D

(PB-205578-F; PB-205578-D; ELR-4334) Avail: NTIS HC $3.00 CSCL 13B

The project is to construct a basic utility airport adequate for propeller driven aircraft weighing less than 12,500 pounds. There will be approximately 10 acres of clearing, slightly

increased intermittent noise levels, slightly increased air pollution, and short-time adverse environmental effects associated with normal construction techniques. GRA

N72-32273# Federal Aviation Administration, Washington, D.C. Airports Service.
JASPER-PICKENS COUNTY AIRPORT, JASPER, GEORGIA Final Environmental Impact Statement
27 Apr. 1972 43 p Supersedes PB-204959-D
(PB-204959-F; PB-204959-D; ELR-4332) Avail: NTIS HC $3.00 CSCL 13B

Pickens County, Georgia, proposes a project to construct a general utility airport adequate to accommodate propeller aircraft of less than 12,500 pounds. There will be about 100 acres of tree clearing, slightly increased intermittent noise levels, slightly increased air pollution, and short-term adverse environmental effects associated with normal construction techniques. GRA

N72-32274# Federal Aviation Administration, Washington, D.C. Airports Service.
NEILLSVILLE MUNICIPAL AIRPORT, NEILLSVILLE, WISCONSIN Final Environmental Impact Statement
14 Apr. 1972 51 p Supersedes PB-204576-D
(PB-204576-F; PB-204576-D; ELR-4228) Avail: NTIS HC $3.00 CSCL 13B

The proposed project includes four items of work to be performed in the development of a new airport. The development will probably cause the following adverse environmental effects: elimination of producing farm land, a slight increase in dust quantity during construction, and a slight increase in ambient noise near the airport. GRA

N72-32275# Federal Aviation Administration, Washington, D.C. Airports Service.
IOWA, OTTUMWA-WAPELLO COUNTY, OTTUMWA INDUSTRIAL AIRPORT, IOWA Final Environmental Impact Statement
27 Apr. 1972 18 p Supersedes PB-207235-D
(PB-207235-F; PB-207235-D; ELR-4329) Avail: NTIS HC $3.00 CSCL 13B

The proposal is described for the installation of an instrument landing system (ILS) and approach lighting system (ALS) for Runway 13/31 (NW/SE). Most of the proposed work is located within the existing boundaries of the airport, except for additional land used for installation of the ALS. Author

N72-32276# Federal Aviation Administration, Washington, D.C. Airports Service.
ASHE COUNTY AIRPORT AUTHORITY, WEST JEFFERSON, NORTH CAROLINA Final Environmental Impact Statement
26 Apr. 1972 28 p Supersedes PB-206552-D
(PB-206552-F; PB-206552-D; ELR-4295) Avail: NTIS HC $3.00 CSCL 13B

The project is to construct a general utility airport which will accommodate substantially all propeller-driven aircraft weighting less than 12,500 pounds. There will be slightly increased intermittent noise levels, slightly increased air pollution and short term adverse environmental effects associated with normal construction techniques. GRA

N72-32277# Federal Aviation Administration, Washington, D.C. Airports Service.
HEMPHILL MUNICIPAL AIRPORT, HEMPHILL, TEXAS Final Environmental Impact Statement
27 Apr. 1972 49 p Supersedes PB-206262-D
(PB-206262-F; PB-206262-D; ERU-433) Avail: NTIS HC $3.00 CSCL 13B

The new Sabine County, Texas, airport is expected to be used primarily by light piston-powered aircraft. It is not expected that the proposed project will measurably increase air or water pollution. Due to location of airport in a substantially uninhabited area, low levels of noise generated by light aircraft operations will have minimal impact. GRA

N72-32278# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
MAT SETS, LANDING Final Report
16 Feb. 1972 7 p refs
(AD-741857; TOP-7-3-070) Avail: NTIS CSCL 01/5

The report describes a method for evaluation of landing mat sets operational and functional performance characteristics. It identifies supporting tests, facilities, and equipment required. It provides procedures for functional performance tests. Author (GRA)

N72-32279# Dayton Univ. Research Inst., Ohio.
RUNWAY DISTRIBUTION STUDY, EUROPEAN COUNTRIES
Robert P. Boehmer Apr. 1972 173 p refs
(Contract F33615-72-C-1049)
(AD-742096; UDRI-TR-72-22) Avail: NTIS CSCL 01/5

The purpose of this study was to establish the distribution of main operating bases (MOB) and forward operating bases (FOB) within 18 European countries. Each country was divided into cells of equal area and the distributions of the runways are with respect to the midpoints of the cells. The report graphically presents the airfield distributions generated by this study. The results are to be used in conjunction with an airlift study to determine the effectiveness of STOL and VTOL aircraft. Author (GRA)

N72-32280# Dayton Univ. Research Inst., Ohio.
RUNWAY DISTRIBUTION STUDY, SELECTED COUNTRIES Technical Report, Sep. 1970 - Sep. 1971
Robert P. Boehmer Sep. 1971 337 p refs
(Contract F33615-71-C-1075)
(AD-742093; UDRI-TR-71-48) Avail: NTIS CSCL 01/5

The purpose of this study was to establish the distribution of main operating bases (MOB) and forward operating bases (FOB) within 44 selected countries. Each country was divided into cells of equal area and the distributions of the runways are with respect to the midpoints of the cells. The report graphically presents the airfield distributions generated by this study. The results are to be used in conjunction with an airlift study to determine the effectiveness of STOL and VTOL aircraft. Author (GRA)

N72-32281# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
APPLICATION OF MODULE THEORY TO DESIGN AND EVALUATION OF AIRFIELD PAVEMENT
Y. T. Chou and O. O. Thompson Mar. 1972 80 p refs
(DA Proj. 4A0-61102-A-859)
(AD-741368; AEWES-Misc-Paper-S-72-7) Avail: NTIS CSCL 01/5

Model-to-prototype similitude requirements were developed in the study for unsurfaced, landing-mat-surfaced, and conventional flexible and rigid pavement structures for airfields. An extensive literature search of model studies was first conducted. The general concept of dimensional analysis in the area of pavement systems was then introduced, followed by identification of important variables, development of pi terms, and formulation of similitude requirements for true and distorted models. A compensated model that distorts one or more design conditions in such a manner that the distortion is compensated is proposed for pavement systems. Other uses of model facilities are also discussed herein. Author (GRA)

N72-32282# Northrop Corp., Hawthorne, Calif. Aircraft Div.
PRELIMINARY DESIGN STUDY FOR AN ADVANCED FIGHTER TYPE IN-FLIGHT SIMULATOR Final Report, 22 Mar. - 22 Oct. 1971
J. T. Gallagher, I. Saworotnow, and R. J. Seemann Wright-

Patterson AFB, Ohio AFFDL Oct. 1971 96 p refs
(Contract F33615-71-C-1366; AF Proj. 8219)
(AD-743970; NOR-71-207; AFFDL-TR-71-149) Avail: NTIS CSCL 14/2

A need was identified for an advanced fighter type inflight simulator. A preliminary design study was conducted to determine the nature and extent of modifications required to convert an existing airplane into an effective, large amplitude six-degree-of-freedom inflight simulator. Conceptual designs of the airplane configuration and variable stability system lead to a preliminary design of a model-following flight control system employing an airborne digital computer to be carried in a modified version of the Agile Eagle II F-4E. The preliminary design involved reconfiguration of the structural, electrical, and hydraulic systems of the airplane. The front and rear cockpits were reconfigured and aerodynamic analyses performed to establish the force and moment capability available to the variable stability system. The performance envelope of the modified airplane was established and the preliminary design study indicated that large amplitude six-degree-of-freedom total mission simulation was realizable with state-of-the-art equipment and techniques. Author (GRA)

N72-32283# Naval Postgraduate School, Monterey, Calif.
A FIXED BASE VARIABLE STABILITY CARRIER APPROACH LANDING SIMULATOR (CALS) M.S. Thesis
John Henry Kahrs, III Mar. 1972 96 p refs
(AD-743768) Avail: NTIS CSCL 14/2

The report describes the design and construction of a fixed-base variable-stability simulator facility combined with the task of landing to a carrier or runway. The solution was mechanized on a hybrid computer with the analog computer solving the equations of motion and the digital computer used for storage, control and graphics generation. The display was in the form of a computer drawn picture on a graphics terminal. Control was by a simulated cockpit placed in front of the display and connected to the analog computer. This project was undertaken not as a design of a training aid but rather as a research tool for further studies in control systems, human engineering and aircraft dynamics. Author (GRA)

N72-32284# Research Analysis Corp., McLean, Va.
TRANSPORTATION SYSTEMS FOR MILITARY AND CIVILIAN OPERATIONS IN NORTHERN REGIONS
N. Ray Sumner, Jr., Stanley Alper, Edward W. Girard, and Andrus Villu Jun. 1972 130 p refs
(Contract DAHC19-69-C-0017)
(AD-743990; RAC-TP-450) Avail: NTIS CSCL 15/5

The report examines the performance and cost of various transportation systems in the northern (Arctic) environment. The scenarios used include both civilian and military transportation problems, and the study explores some of the relationships among these in an Alaskan environment. Systems examined include such conventional systems as railroads, trucks, boats, and tracked vehicles, plus more advanced systems as fixed- and rotary-wing aircraft and surface effect vehicles (SEVs). In addition to these comparative analyses, certain specific issues are examined in some detail. Included in such issues are the economics of using SEVs as transitional vehicles in undeveloped regions, prior to investment in roads and railroads, the potential utility of a SEV-helicopter team in search and rescue missions, and the relationship between transportation and Alaskan development. Author (GRA)

N72-32285# Army Edgewood Arsenal, Md.
MODIFICATIONS AND CHARACTERIZATION OF A LOW SPEED OPEN-CIRCUIT WIND TUNNEL Technical Report, Aug. 1968 - May 1971
William A. Cooper Apr. 1972 45 p refs
(DA Proj. 1B0-62116-A-084; DA Proj. 1B0-62116-A-084)
(AD-743454; EA-TR-4636) Avail: NTIS CSCL 14/2

The object of the study was to improve the airflow characteristics of a low speed, open-circuit wind tunnel to allow its use for studying the impaction mechanisms of particles on collectors. Modifications to the settling chamber and transition section of the tunnel are described that resulted in an improved speed range and an acceptable constant turbulence level. Vertical and horizontal profiles of the longitudinal turbulent velocity component were obtained with a constant temperature anemometer. Author (GRA)

N72-32286# Naval Ordnance Lab., White Oak, Md.
RADAR TARGET APPROACH SIMULATOR
Harold A. Cook 16 Dec. 1971 47 p refs
(AD-744242; NOLTR-72-8) Avail: NTIS CSCL 14/2

A technique employed to generate nondispersive, continuously variable microwave time delay for the simulation of the approach of a radar to its target is described. A bulk elastic wave excited in a transparent crystal enables thousands of feet of propagation range time delay to be achieved in one-inch crystal lengths. A CW HeNe laser is used to read the variably delayed radar signal out of the elastic wave in the transparent crystal. The performance parameters of the Dynamic Fuze Simulator (DYFUS) Model 127 are given and the DYFUS generated approach to target waveforms with two radar fuzes are briefly outlined. Author (GRA)

12 FLUID MECHANICS

Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

N72-32287 National Lending Library for Science and Technology, Boston Spa (England).
EFFECTS EXERTED ON SPRAY CHARACTERISTICS OF SPIRAL TYPE INJECTION VALVES BY AMBIENT AIR PRESSURES
K. Neya and S. Sato Aug. 1972 24 p refs Transl. into ENGLISH from Nippon Kikai Gakkaishi (Japan), v. 70, no. 581, 1967 p 817-826
(NLL-RTS-7250) Avail: Natl. Lending Library, Boston Spa, Engl.: £2.40; 8 NLL photocopy coupons

The effects of ambient air pressures on the spray characteristics of swirl type injectors were investigated by studying the dispersion volume distribution, and mean particle diameters of water sprayed into a chamber. It was found that the external appearance of the spray did not vary with pressure change, and spray down flow underwent wilting at high pressures. It is concluded that combustors in gas turbines which use swirl type atomizers are subject to complex variations in spray characteristics due to air pressure. F.O.S.

N72-32288 Engineering Sciences Data Unit, London (England).
FLUID FORCES, PRESSURES AND MOMENTS ON RECTANGULAR BLOCKS
Sep. 1971 47 p refs Sponsored by Roy. Aeron. Soc., Inst. Chem. Engr., Inst. Mech. Engr., and Inst. Struct. Engr.
(ESDU-71016) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Data are provided on the mean (time average) force, pressure, and moment coefficients for use in estimating the forces, pressures, and moments on single rectangular sectioned blocks or prisms as a result of fluid flow past them. The information can be applied in a wide range of engineering problems concerned with fluid flow around rectangular blocks, such as in the design of buildings, in the evaluation of the effects of projections on buildings, on marine, road and flight vehicles and in ductwork, and in the analysis of such problems as blocks suspended from cables. Basic information is given on force and moment coefficients for solid or impermeable blocks with sharp leading edges in an unbound, smooth, uniform, low

speed flow. The effects of departures from datum conditions are discussed. Author

N72-32289 Engineering Sciences Data Unit, London (England).
APPROXIMATE WAVE DRAG OF RECTANGULAR PLANFORM FAIRINGS AT ZERO INCIDENCE IN SUPERSONIC FLOW
Sep. 1971 10 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-71018) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

A numerical analysis of the approximate wave drag of rectangular planform fairings at zero degrees incidence in supersonic flow is discussed. The data were derived using linearized supersonic flow theory and are limited in application to fairings with small values of local slope. A bibliography of publications on the subject is included. Line drawings, graphs, and mathematical models are developed to support the theoretical considerations. P.N.F.

N72-32290 Engineering Sciences Data Unit, London (England).
INVISCID SUPERSONIC FLOW PAST CONES AT ZERO INCIDENCE. 1: SHOCK ANGLE
Jul. 1970 8 p refs Supersedes ESDU-Aero-S.00.03.12 Sponsored by Roy. Aeron. Soc.
(ESDU-70008) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Data are presented for the shock angle of a sharp-nosed right circular cone at zero incidence in a uniform flow of air considered to be a perfect gas. The flow is assumed to be inviscid throughout. The data presented are for cones at zero incidence in air flows with Mach numbers up to 4. K.P.D.

N72-32291 Engineering Sciences Data Unit, London (England).
FLUID FORCES ACTING ON CIRCULAR CYLINDERS FOR APPLICATION IN GENERAL ENGINEERING. PART 2: FINITE-LENGTH CYLINDERS
Jan. 1971 26 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-70014-Pt-2) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Mean (time-averaged) forces are considered which are associated with the flow of fluid around circular cylinders whose axes are normal to the flow. Data are presented for finite-length cylinders in uniform flow and shear flow. These data are related to the forces on long (two-dimensional) circular cylinders, and are given in the form of nondimensional mean force coefficients, which are used in conjunction with predetermined expected free stream (e.g. wind) velocities, to determine the actual forces. Author

N72-32292 Engineering Sciences Data Unit, London (England).
FLUID FORCES ACTING ON CIRCULAR CYLINDERS FOR APPLICATION IN GENERAL ENGINEERING. PART 1: LONG CYLINDERS IN TWO DIMENSIONAL FLOW
Oct. 1970 38 p refs Sponsored by Roy. Aeron. Soc., Inst. of Mech. Engr., and Inst. of Chem. Engr.
(ESDU-70013-Pt-1) Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Mean (time-averaged) forces are considered which are associated with fluid flow across circular cylinders whose axes are normal or inclined to the flow. Data are given for both laminar and turbulent flow and for smooth and rough surfaces. Allowance was made for the effects of free stream turbulence. The data are presented in the form of nondimensional mean force coefficients which are used, in conjunction with predetermined expected free stream (e.g. wind) velocities, to determine the actual forces. The derivation of the data and a flow chart, are also given, specifying the calculations to be made for estimating the forces. Author

N72-32293 Engineering Sciences Data Unit, London (England).
INVISCID SUPERSONIC FLOW PAST CONES AT ZERO INCIDENCE. 4: MACH NUMBER IN THE CONICAL FLOW FIELD
Jul. 1970 10 p refs Supersedes in part Aero-S.00.03.12 Sponsored by Roy. Aeron. Soc.
(ESDU-70010; Aero-S.00.03.12) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-258 Regent Street, London W1R 7AD

Data are given for Mach numbers increasing from the shock detachment value to a value of four for cones with semivertex angles from zero to 50 degrees. Data for the Mach number are given on the surface of a sharp-nosed, right circular cone at zero incidence in a uniform supersonic flow of air considered as a perfect gas. Author

N72-32294 Engineering Sciences Data Unit, London (England).
INVISCID SUPERSONIC FLOW PAST CONES AT ZERO INCIDENCE. 3: FLOW DEFLECTION IN THE CONICAL FLOW FIELD
May 1970 10 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-7009) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Data are presented for flow deflection of a streamline in the conical flow field between the shock and the surface of a sharp-nosed, right circular cone at zero incidence. The air flow, considered to be a perfect gas, in both uniform and supersonic. Deflection data is given for Mach numbers increasing from the shock detachment value to a value of four for cones with semivertex of 5, 10, 15, 20, 25, 30, 40, and 50 degrees. Author

N72-32295 Engineering Sciences Data Unit, London (England).
FLUID FORCES AND MOMENTS ON FLAT PLATES
Jan. 1971 22 p refs Sponsored by Roy. Aeron. Sci., Inst. of Mech. Engr., Inst. of Chem. Engr.
(ESDU-70015) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Data on the normal forces and center of pressure positions for thin flat plates of various shapes are presented in terms of nondimensional mean force coefficients, which are used in conjunction with predetermined free stream velocities (e.g. wind velocity) to determine the actual forces acting on a plate. The data are predominantly for isolated plates in uniform flows. However, data for surface mounted rectangular plates are given and a method of allowing for the effects of a shear flow (i.e. an approach flow with a velocity gradient, such as a ground boundary layer) is also given. Author

N72-32296*# Iowa State Univ. of Science and Technology, Ames.
DEVELOPMENT OF EQUILIBRIUM AIR COMPUTER PROGRAMS SUITABLE FOR NUMERICAL COMPUTATION USING TIME-DEPENDENT OR SHOCK-CAPTURING METHODS
John C. Tannehill and Robert A. Mohling Washington NASA Sep. 1972 50 p refs
(Grant NGR-16-002-038)
(NASA-CR-2134) Avail: NTIS HC $3.00 CSCL 20M

Computer programs were developed which compute the thermodynamic properties of equilibrium air for use in either the time-dependent or shock-capturing computational methods. For the time-dependent method, the NASA-ARC RGAS computer program was modified to allow internal energy and density to be used as the independent variables. In addition, simplified-curve fits for p = p(e,rho), a = a(e,rho), and T = T(p,rho) were devised to reduce computer time. For the shock-capturing method a simplified curve fit for h = h(p,rho) was made. These approximate curve fits may be particularly useful when employed on advanced computers such as the Illiac 4 or the CDC Star since they avoid the cumbersome table-lookup feature of the RGAS program. Author

N72-32297*# Martin Marietta Corp., Baltimore, Md. Research Inst. for Advanced Studies.

ASYMMETRIC HYPERSONIC FLOW

Stephen H. Maslen Washington NASA Sep. 1972 34 p refs (Contract NAS1-10193)

(NASA-CR-2123) Avail: NTIS HC $3.00 CSCL 20D

A general method for the analysis of the inviscid asymmetric hypersonic flow fields enveloping smooth bodies of general shape is given. The method is based on the assumption of a thin shock layer which yields an expression for pressure in generalized Mises coordinates. Numerical results for elliptic cones at angle of attack are shown to compare well with experiments and other theories. The computing logic for a blunt body is described, and a limiting solution at the stagnation point is presented. Author

N72-32298# Royal Aircraft Establishment, Farnborough (England).

THE PART PLAYED BY CAVITATION IN THE BREAKDOWN OF SOLID BODIES WHEN THESE IMPINGE ON DORPS

R. G. Perelman Aug. 1972 12 p refs Transl. into ENGLISH from Iz Vuzov Mashinostr. (USSR), v. 11, 1971 p 68-73

(RAE-Lib-Trans-1655) Avail: NTIS HC $3.00

An explanation is sought for the erosion of rigid surfaces on impact with drops by cavitation phenomena. It is shown that even for a hypothesis based on loading by cumulative microjets, the part played by cavitation phenomena for speeds greater than 30 meters per second is negligibly small. Experimental confirmation is given of the view that erosion damage under such conditions is determined by the effect of discrete drops, and it is from this point that we should start in determining the erosion stability of working blades in the last stages of condensation steam turbines. Author

N72-32299# Royal Aircraft Establishment, Farnborough (England).

THE ESTIMATION OF IMPULSIVE PRESSURES ARISING IN THE IMPACT OF A DROP AGAINST A SOLID SURFACE

M. I. Khmelnik Aug. 1972 13 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk, Mekhan. i Mashinostr. (Moscow), v. 1, 1962 p 179-182

(RAE-Lib-Trans-1653) Avail: NTIS HC $3.00

In an estimation of impact pressures of a drop with a solid surface, the deformation of the surface of the drop and the onset of post collisional motion of the liquid are considered. Equations of maximum pressure are developed and their dependence on the extent of wetting of the solid surface shown to be significant. They are not, however, greatly affected by the shape of the free surface formed by the drop on impact. It is also shown how excessive flattening of the drop leads to a reduction of impact pressures. Author

N72-32300*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A PROGRAM FOR CALCULATING EXPANSION-TUBE FLOW QUANTITIES FOR REAL-GAS MIXTURES AND COMPARISON WITH EXPERIMENTAL RESULTS

Charles G. Miller, III Washington Sep. 1972 99 p refs

(NASA-TN-D-6830; L-8361) Avail: NTIS HC $3.00 CSCL 20D

A computer program written in FORTRAN 4 language is presented which determines expansion-tube flow quantities for real test gases CO2 N2, O2, Ar, He, and H2, or mixtures of these gases, in thermochemical equilibrium. The effects of dissociation and first and second ionization are included. Flow quantities behind the incident shock into the quiescent test gas are determined from the pressure and temperature of the quiescent test gas in conjunction with: (1) incident-shock velocity, (2) static pressure immediately behind the incident shock, or (3) pressure and temperature of the driver gas (imperfect hydrogen or helium). The effect of the possible existence of a shock reflection at the secondary diaphragm of the expansion tube is included. Expansion-tube test-section flow conditions are obtained by performing an isentropic unsteady expansion from the conditions behind the incident shock or reflected shock to either the test-region velocity or the static pressure. Both a thermochemical-equilibrium expansion and a frozen expansion are included. Flow conditions immediately behind the bow shock of a model positioned at the test section are also determined. Results from the program are compared with preliminary experimental data obtained in the Langley 6-inch expansion tube. Author

N72-32301*# Scientific Translation Service, Santa Barbara, Calif.

SUPERSONIC FLOW IN A CORNER FORMED BY INTERSECTING PLATES

V. N. Mikhaylov and V. S. Tamilov Washington NASA Sep. 1972 8 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Mekh. Zhidk. Gaza (Moscow), Mar. - Apr. 1972 p 162-166

(Contract NASw-2035)

(NASA-TT-F-14537) Avail: NTIS HC $3.00 CSCL 20D

A numerical solution is presented for the problem of supersonic flow around a corner formed by two perpendicular plates. The method of characteristics is used in the solution, and the results obtained are given. The data derived are compared with experimental findings. Author

N72-32302*# Scientific Translation Service, Santa Barbara, Calif.

SUBSONIC AND SUPERSONIC FLOW AROUND NONAXISYMMETRIC FUSELAGES

Hermann Rothman Washington NASA Sep. 1972 20 p refs Transl. into ENGLISH from Z. Flugwiss. (Brunswick), v. 20, Mar. 1972 p 98-105

(Contract NASw-2035)

(NASA-TT-F-14547) Avail: NTIS HC $3.00 CSCL 20D

A method for calculating the flow about nonaxisymmetric bodies in subsonic and supersonic flow is described. The bodies are constructed by means of the streamlines on their surface. Source, dipole, and quadrupole singularities are assumed on a curved camberline. The differential equations for the streamlines are derived and are numerically integrated. At the tip of the body, which is the initial point of the integration as well as a singular point of the differential equations, the problem can be solved by a transformation to conical coordinates. Different cross-sections and longitudinal sections of the body can be produced by varying the source, dipole, and quadrupole strengths as well as the camber of the camberline. This method seems to be particularly suitable in cases in which the streamlines are of interest. Using this method, the pressure distribution and the air forces on bodies can be determined. Author

N72-32303*# Scientific Translation Service, Santa Barbara, Calif.

FLOW CONTROL BY CROSS JET

Henri Werle and Marc Gallon Washington NASA Sep. 1972 23 p refs Transl. into ENGLISH from Aeronaut. Astronaut. (Paris), no. 34, 1972 p 21-33

(Contract NASw-2035)

(NASA-TT-F-14548) Avail: NTIS HC $3.25 CSCL 20D

The studies which showed that a jet oriented crosswise reduces the flow separation around models are reported. Water tunnel visualizations presented confirm results obtained in air. They show, in particular, the flow pattern and its evolution through the jet action, and reveal the process efficiency in a variety of cases: cylinder, perpendicular flat plate, contoured wall, rearward step, unswept wing, deflected flap, swept wing, diverging duct, fluidic system, etc. Author

N72-32304*# Translation Consultants, Ltd., Arlington, Va.

TURBULENT FLOWS WITH ELASTIC BOUNDARIES

V. B. Amfilokhiyev Washington NASA Oct. 1972 13 p refs Transl. into ENGLISH from the book "Gidrodinamicheskiye voprosy bioniki" Kiev, Naukova Dumka, 1969 p 46-51

(Contract NASw-2038)

(NASA-TT-F-14601) Avail: NTIS HC $3.00 CSCL 20D

The possibility of changing the value of turbulent friction by using elastic coatings exhibiting characteristics similar to those of sea mammal skins is examined. The study uses a semiempirical theory of turbulence based on the mixing length concept. Allowance is made for the effects of the surface elastic properties on the mixing length. Problems considered include the flow in a circular cylindrical tube with smooth and rough walls, and the boundary-layer flow. It is shown that certain coating properties reduce tangential turbulence stresses as compared to rigid coatings. Author

N72-32305# Joint Publications Research Service, Arlington, Va.
THREE-DIMENSIONAL FLOW SEPARATIONS DURING A SUPERSONIC FLOW AROUND SOLID AND GASEOUS OBSTACLES
A. I. Zubkov, Yu. A. Panov, A. M. Voytenko, and A. I. Glagolev 6 Sep. 1972 6 p refs Transl. into ENGLISH from Tr. 1 Respublikanskoy Konferentsii Po Aerogidromekhanike, Teplo-obmenu i Massoobmenu (Kiev), 1969
(JPRS-56959) Avail: NTIS HC $3.00

Supersonic streams flowing around solid cylindrical and circular jet obstructions situated on a plate are discussed. It is shown that in the general case the separation line is a universal curve and can be approximated by an expression. Author

N72-32306# Joint Publications Research Service, Arlington, Va.
DESCRIPTION OF CHEMICALLY EQUILIBRIUM FLOWS OF MULTICOMPONENT IONIZED MIXTURES WITHIN THE FRAMEWORK OF THE NAVIER-STOKES AND PRANDTL EQUATIONS
O. N. Suslov, G. A. Tirskiy, and V. V. Shchennikov 14 Sep. 1972 25 p refs Transl. into ENGLISH from Zh. Prikl. Mekhan. i Tekhn. Fiz. (Moscow), no. 1, 1971 p 73-89
(JPRS-57017) Avail: NTIS HC $3.25

Formulations of problems on equilibrium flows are presented. Consideration is given to ionization, thermal, and barodiffusion reactions for arbitrary mixtures with various diffusion properties. The analysis is conducted within the framework of complete Navier-Stokes equations and the Prandtl equations of an asymptotic fine boundary layer, near an impermeable and a thermochemically destructible wall. Author

N72-32307# Royal Aircraft Establishment, Farnborough (England).
THE STRENGTH OF MATERIALS UNDER THE ACTION OF DROPLET IMPACTS
R. G. Perelman and Yu. D. Denisov Jul. 1972 19 p refs Transl. into ENGLISH from Probl. prochnosti (USSR), v. 10, 1971 p 20-26
(RAE-Lib-Trans-1654; BR-31025) Avail: NTIS HC $3.00

Mechanisms by which materials are destroyed under the action of droplet impacts are discussed, with particular reference to the blades of wet steam turbines. Fatigue limits and threshold speeds are determined experimentally and the effect of droplet size examined. An explanation is given of the change of structure following erosion. Calculations predict that the effect of the retention of water by the resulting surface texture is to reduce erosion rates. The resistance of materials to erosion is evaluated from relevant parameters such as the number of load cycles and the energy capacity of the material before fracture. Author

N72-32308# Royal Aircraft Establishment, Farnborough (England).
THE CALCULATION OF PRESSURES IN THE COLLISION OF A DROP WITH A PLANE
R. G. Perelman Jul. 1972 12 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Mashinostr. (Moscow), no. 7, 1968 p 84-90
(RAE-Lib-Trans-1652; BR-31024) Avail: NTIS HC $3.00

The collision of a spherical liquid drop with a plane rigid surface at a right angle is considered and an equation derived for determining the pressure in the zone of contact. The results of experimental determination of the pressure are given which allow the theoretical equation obtained to be used for pressure determination in the solution of practical problems. Author

N72-32309# Aeronautical Research Labs., Melbourne (Australia).
A SURVEY OF WATER TUNNEL FLOW VISUALISATION TECHNIQUES
D. H. Thompson Jan. 1972 26 p refs
(ARL/A-Note-335) Avail: NTIS HC $3.50

Techniques for the visualization of water flow are discussed. The techniques are applied to the flow in a 25 centimeter by 25 centimeter water tunnel. It is concluded that the most suitable flow tracers for general water tunnel use are colored dyes, hydrogen bubbles, polystyrene beads, and air bubbles. Author

N72-32310# National Aeronautical Establishment, Ottawa (Ontario).
ON ATOMIZATION AND LINEARIZED FREE-SURFACE INSTABILITY ON ROTATING BODIES
A. M. Drummond Jun. 1972 29 p refs
(NRC-12765; LR-561) Avail: NTIS HC $3.50

A surface-wave instability theory to explain the process of atomization from spinning discs and cups is developed. The motivation to do this rests on the proven surface instability of fluid ligaments and sheets and in the hope of showing a unified mechanism for the explanation of fluid atomization. No attempt is made to discuss drop-size distributions resulting from the atomization process and no new experimental data are presented. However, attempts at using existing experimental data to verify the theory are made. Author

N72-32311# Department of Supply, Melbourne (Australia).
THE TURBULENT BOUNDARY LAYER AS A WALL CONFINED WAKE
W. H. Schofield and A. E. Perry (Melbourne Univ.) Feb. 1972 75 p refs
(ARL/ME-134) Avail: NTIS HC $5.75

Some existing models for the mean velocity field of two dimensional turbulent boundary layers developing in adverse pressure gradients are examined and found unsatisfactory in several respects. This report proposes a new model. The proposed model is derived by considering adverse pressure gradient boundary layers as wakes in which large lateral motions are suppressed by a frictionless rigid splitter plate. Boundary layers which have finite wall shear stresses depart from this model. However the departures are confined to a thin region adjacent to the boundary and here the familiar law of the wall applies. It is shown from the data that the mean velocity outside the logarithmic region of adverse pressure gradient layers can be described by a universal relation of the velocity defect type. An analysis shows that the functional form of this defect relation near its junction with the logarithmic region is of the half power form with a gradient directly dependent on the position and magnitude of the local maximum shear stress. Author

N72-32312*# Techtran Corp., Glen Burnie, Md.
MOTION OF A FLUID BOUNDED BY A FLEXIBLE FILM
F. L. Chernousko Washington NASA Sep. 1972 18 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Mekh. Zhidk. Gaza (Moscow), no. 1, Jan.-Feb. 1970 p 104-112
(Contract NASw-2037)
(NASA-TT-F-14575) Avail: NTIS HC $3.00 CSCL 20D

A discussion is presented on the two-dimensional problem of the motion of an ideal incompressible fluid of constant density. The fluid moves along a groove formed by an absolutely flexible nonexpandable film whose ends are either firmly fixed or move in a prescribed manner. The motion of the fluid is assumed to be two-dimensional and irrotational. Surface tension is neglected. Certain peculiarities of the flow are examined for a tensely stretched film and for an unstretched film (in which case a cavern forms between the fluid and the film). The conditions

for the onset of a hydrodynamic shock for a fluid bounded by a closed film are defined. Author

N72-32313*# Techtran Corp., Glen Burnie, Md.
RATIONAL CALCULATION OF LAMINAR AND TURBULENT COMPRESSIBLE BOUNDARY LAYERS WITH HEAT TRANSFER
Norbert Scholz Washington NASA Sep. 1972 18 p refs Transl. into ENGLISH from Z. Flugwiss. (Brunswick), v. 7, no. 2, 1959 p 33-39
(Contract NASw-2037)
(NASA-TT-F-14578) Avail: NTIS HC $3.00 CSCL 20D

An approximate procedure for the calculation of laminar and turbulent boundary layers with available pressure and wall temperature is given for engineering use. The influence of compressibility and heat transfer on the boundary layer flow is taken into account. Some results of calculation are included. Author

N72-32314*# Kanner (Leo) Associates, Redwood City, Calif.
SPACE-TIME CORRELATIONS OF VELOCITIES IN DUCT TURBULENCE
Jean Sabot and Genevieve Comte-Bellot Washington NASA Feb. 1972 6 p refs Transl. into ENGLISH from Compt. Rend., Ser. A. Sci. Math. (France), v. 273, no. 14, 4 Oct. 1971 p 638-641 Sponsored by NASA
(NASA-TT-F-14463) Avail: NTIS HC $3.00 CSCL 20D

The space-time correlations between longitudinal components of velocity fluctuations are explored in a smooth circular duct up to longitudinal separations of 31.5 mm in diameter. The convection velocity of the turbulent field is determined for several distances from the wall and for two flow rates, as well as the memory of the turbulence as followed within this convection movement. Author

N72-32315*# National Aeronautics and Space Administration, Washington, D.C.
PROPAGATION OF SHOCK WAVES IN POLYTROPIC GAS SPHERES
D. K. Nadezhin and D. A. Frank-Kamenetskiy Jun. 1972 41 p refs Transl. into ENGLISH from Vopr. Kosmogonii, Akad. Nauk SSSR (Moscow), v. 10, 1964 p 154-178
(NASA-TT-F-14438) Avail: NTIS HC $4.25 CSCL 20D

Partial differential equations describing spherically symmetrical adiabatic motions of an ideal gas were integrated by the method of finite differences. Stationary stellar models were perturbed in the following manner: an inward velocity was given to matter located near the center of the star (central collapse), then collapse was produced in some peripheral layers; finally cooling occurred in the central stellar region. These perturbations led to the formation of shock waves. A set of calculations was performed as a function of the amount of perturbation. The calculations permit the evaluation of the relation between the kinetic energy of the expanding envelope and its mass. This relation can be approximated by a power function. Author

N72-32316*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TOTAL PRESSURE AVERAGING IN PULSATING FLOWS
L. N. Krause, T. J. Dudzinski, and R. C. Johnson 1972 22 p refs Presented at Symp. on Instrumentation for Airbreathing Propulsion, Monterey, Calif., 19-21 Sep. 1972
(NASA-TM-X-68128; E-7100) Avail: NTIS HC $3.25 CSCL 20D

A number of total-pressure tubes were tested in a non-steady flow generator in which the fraction of period that pressure is a maximum is approximately 0.8, thereby simulating turbomachine-type flow conditions. Most of the tubes indicated a pressure which was higher than the true average. Organ-pipe resonance which further increased the indicated pressure was encountered within the tubes at discrete frequencies. There was no obvious combination of tube diameter, length, and/or geometry variation used in the tests which resulted in negligible averaging error. A pneumatic-type probe was found to measure true average pressure, and is suggested as a comparison instrument to determine whether nonlinear averaging effects are serious in unknown pulsation profiles. The experiments were performed at a pressure level of 1 bar, for Mach number up to near 1, and frequencies up to 3 kHz. Author

N72-32317*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL STUDY OF WALL BOUNDARY LAYER GROWTH IN THE 10 DEG HALF ANGLE CONICAL NOZZLE OF A REFLECTED SHOCK TUNNEL
Gene P. Menees Washington Sep. 1972 30 p refs
(NASA-TM-X-2647; A-4509) Avail: NTIS HC $3.00 CSCL 20D

Calibration studies of shock-tunnel nozzle flow were made in both N2 and Ar for a reservoir temperature of 2000 deg K and reservoir pressures of 15, 85, and 130 atm. The results for both test gases showed that the boundary layer was turbulent and the growth nonlinear, with the thickness being greater in Ar than N2 at comparable reservoir conditions. The boundary-layer thickness decreased with increasing reservoir pressure, but only small differences occurred between the two largest reservoir pressures. Good correlations of the boundary layer and displacement thickness were obtained for both N2 and Ar in terms of Reynolds number based on a reference temperature. Author

N72-32318*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
INITIAL DEVELOPMENT OF A HYPERSONIC FREE MIXING LAYER
William D. Harvey and Robert L. Bolton Washington Oct. 1972 23 p refs
(NASA-TM-X-2602; L-8409) Avail: NTIS HC $3.00 CSCL 20D

A preliminary experimental investigation to establish some of the characteristics and further the understanding of the initial development of a turbulent free mixing layer for hypersonic speeds has been conducted. Mean profile data at about 6 inches downstream of the exit of a hypersonic nozzle have been obtained in nitrogen for a nominal Mach number of 19.5, total temperature of about 1670 K and Reynolds number range from about 50,000 to 110,000 per foot and have been compared with profiles upstream of the nozzle exit. Static pressure varied across the shear layer for the present tests. The outer 80 percent of the high-velocity portion of the free shear layer can be calculated by a rotational method of characteristics. However, turbulent mixing is evidently important in the low-velocity region, and effects of eddy viscosity and eddy conductivity should be included in a theoretical analysis. Author

N72-32319# Sandia Labs., Livermore, Calif.
CHARACTERIZATION OF FLOW GEOMETRIES IN FLOW CONTROL DEVICES
R. M. German Mar. 1972 35 p refs
(Contract AT(29-1)-789)
(SCL-DR-710351) Avail: NTIS

Flow geometry characterization by improved techniques is presented, including the operation of powder metallurgical flow control devices. Sintered flow devices are fully characterized with respect to size, shape, placement, and quantity of flow contributing pores. Viable prototype designs constructed by both uniaxial and isostatic hot pressing techniques are characterized. Results indicate that parts formed by the isostatic hot pressing technique have the greatest potential for a reproducible, well defined, flow geometry. Author

N72-32320# Harry Diamond Labs., Washington, D.C.
FLUERICS 23: A BIBLIOGRAPHY, REVISION B
Vondell Carter and David S. Marsh Apr. 1972 483 p refs

(Proj. 1T0-61102-A-33-B; HDL Proj. 31100)
(AD-743800; HDL-TR-1495-Rev-B) Avail: NTIS CSCL 13/7

The update bibliography of the literature in fluerics and fluidics technology contains approximately 782 citations of articles, books and papers, and 538 descriptions of patents and disclosures. Titles of papers published in the proceedings of all major symposia of the last eight years are listed. Key-Word-in-Context (KWIC) indexes of titles are used to allow ready access to all documents pertinent to a given subject. Author and inventor indexes are also provided. The introduction to the bibliography gives instructions for use and lists organizations from which information on fluidics and fluerics may be obtained.
Author

N72-32321# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AERODYNAMICS OF A SWIRLING FLOW IN AN ANNULAR CHANNEL

A. V. Sudarev 23 Mar. 1972 12 p refs Transl. into ENGLISH from Energomashinostroenie (USSR), v. 15, no. 1, 1969 p 45-46
(AD-744157; FTD-HT-23-1277-71) Avail: NTIS CSCL 20/4

The aerodynamics of a twisted swirling flow in an annular passage was studied to investigate the intensification of convective heat exchange using different types of turbulence agents. By examining the velocity distribution, a mechanism of convective heat exchange is proposed. Comparative measurement data on the axial and tangential velocity components of air flow are given.
Author (GRA)

N72-32322# Army Foreign Science and Technology Center, Charlottesville, Va.

SYSTEMS OF QUASILINEAR EQUATIONS AND THEIR APPLICATIONS TO GAS DYNAMICS

Boris Leonidovich Rozhdestvenskii and Nikolai Nikolaevich Yanenko 4 May 1972 96 p refs Transl. into ENGLISH of the book "Systemy Kvazilineinykh Uravnenii, i ikh Prilozheniya k Gaz. Dinam." Moscow, 1968 592 p
(AD-743579; FSTC-HT-23-1044-71) Avail: NTIS CSCL 20/4

Mathematical methods of investigating one-dimensional problems in gas dynamics are presented. Systems of quasilinear equations and principal problems for hyperbolic systems are studied in detail. Equations of gas dynamics are derived and investigated; analytic solutions of gas dynamics are presented; discontinuous flows containing shock waves are studied. The fundamentals of the theory of difference schemes are set forth and a variety of numerical solution methods for gas dynamics problems employed in practical calculations are set forth. A theory of the generalized solution is outlined for systems of quasilinear equations of the hyperbolic type. The monograph contains the results of recent work on these problem areas.
Author (GRA)

N72-32323# Naval Ship Engineering Center, Philadelphia, Pa.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF CONIC ENTRANCE ORIFICE PERFORMANCE IN THE LOW REYNOLDS NUMBER DOMAIN

Ronald F. Bruner 18 Apr. 1972 69 p ref
(SF35433008)
(AD-743479; NAVSECPHILADIV-A-1000) Avail: NTIS CSCL 13/10

A constant discharge coefficient (Cd), relating flow rate to the square root of the differential pressure across a primary element, is a desirable characteristic of any flow sensor to be used in shipboard automatic control systems. Although the simple, square edged orifice meets this criterion for turbulent flows, Cd does not remain constant for applications in the laminar and transitional regions of pipe Reynolds number (ReD). In a quest for a device which exhibits both simplicity and constant Cd at low ReD, twelve conic entrance orifice plates were tested.
Author (GRA)

N72-32324# Naval Ship Research and Development Center, Bethesda, Md.

GENERATION AND PROPAGATION OF VORTICITY UNDER THE PERFECT-SLIP CONDITION

Hans J. Lugt Feb. 1972 21 p refs
(SR0140301)
(AD-743489; NSRDC-3794) Avail: NTIS CSCL 13/10

Renewed interest in slip flow within the realm of continuum physics has resulted in a numerical study on generation and propagation of vorticity in a flow past thin elliptic cylinders under the perfect-slip condition. Computer results show that surface vorticity is more concentrated at the edges for perfect slip than for nonslip, due to the surface curvature. Flow separation, instability, and vortex shedding occur also under the perfect-slip condition. Although drag is drastically reduced for slender body configurations, drag coefficients for a plate normal to the flow are almost the same for nonslip and perfect slip, at least for Reynolds number 10. All computations were carried out for Reynolds numbers below 200.
Author (GRA)

N72-32325# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

HYPERSONIC FLOW AROUND A THIN THREE-DIMENSIONAL BODY

L. I. Dzvonyk 28 Mar. 1972 10 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. SSR (Kiev), no. 3, 1971 p 220-223
(AD-744143; FTD-HC-23-2091-71) Avail: NTIS CSCL 20/4

Hypersonic nonviscous flow about a thin three-dimensional body of triangular wing shape was investigated. In the framework of asymptotic theory of small perturbations, equations of motion and boundary conditions for the general class of perturbations were obtained. Flow about such a body is divided into two regions: an external region of uniform flow and a central region with conical flow. The first region is examined in the present paper.
Author (GRA)

N72-32326# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.

CORRELATION OF FLOW RESISTANCE AND REFLECTION COEFFICIENT FOR WEAK SHOCK WAVES Final Report

Donald P. McErlean, Douglas C. Rabe, and Richard B. Rivir Apr. 1972 85 p refs
(AF Proj. 3145)
(AD-744509; AFAPL-TR-72-3) Avail: NTIS CSCL 20/11

A study was made to determine if there is any correlation between a weak shock reflection coefficient and flow resistance of various materials. A computer program is included showing the reduction of experimental data in calculating flow resistance.
Author (GRA)

N72-32327# Army Foreign Science and Technology Center, Charlottesville, Va.

UNSTABLE INTERNAL WAVES IN A VISCOUS FLUID

V. S. Fedosenko and L. V. Cherkesov 18 May 1972 25 p refs Transl. into ENGLISH from Tr. Akad. Nauk Ukr. RSR, Morsk. Hidrofiz. Inst. (Kiev), no. 1(43)
(AD-744512; FSTC-HT-23-1498-72) Avail: NTIS CSCL 20/4

Hydrodynamic equations are set forth to explain unstable internal waves in a viscous fluid.
Author (GRA)

N72-32328# Purdue Univ., Lafayette, Ind.

SPECTROSCOPIC STUDY OF THE BEHAVIOR OF XENON BEHIND A SHOCK WAVE

H. Semerjian (Brown Univ.) May 1972 141 p refs
(Contract N00014-67-A-0226-0005; Proj. SQUID)
(AD-744271; SQUID-TR-BRN-22-PU) Avail: NTIS CSCL 07/4

Measurements of the absolute intensity of radiation are performed on the continuum and line emission from shock-heated xenon gas. The line radiation measurements are used to determine the maximum gas temperature behind the shock wave. The continuum emission measurements are used to

determine the correction factor for the absorption coefficient of xenon and the radiative cooling rates after the maximum temperature is reached. Values of temperature and electron concentration, calculated from measured shock wave velocities and the Rankine-Hugoniot conditions, are used to determine the values of the absorption coefficient. Results are compared with the theoretical calculations of Schluter and of Biberman and Norman, and good agreement is observed. Boundary layer effects behind the shock wave are also considered.
Author (GRA)

N72-32329# Wisconsin Univ., Madison. Mathematics Research Center.
A PRIORI BOUNDS FOR SOME BIFURCATION PROBLEMS IN FLUID DYNAMICS
Paul H. Rabinowitz Apr. 1972 30 p refs
(Contracts DA-31-124-ARO(D)-462; N00014-67-A-0128-0004) (AD-744330; MRC-TSR-1221) Avail: NTIS CSCL 20/4

A priori bounds are obtained for some bifurcation problems in fluid dynamics, in particular for the Taylor and the usual Benard problem as well as the generalization of the latter to the case where there is an external magnetic field. It is also shown how the bounds can be used to obtain existence results.
Author (GRA)

N72-32330# Purdue Univ., Lafayette, Ind. Automatic Control Center.
THE OPTIMUM SHAPING OF AXISYMMETRIC BODIES FOR MINIMUM DRAG IN INCOMPRESSIBLE FLOW
Jerome S. Parsons and Raymond E. Goodson Jun. 1972 200 p refs
(Contract N00014-67-A-0226-0012; NR Proj. 041-423) (AD-744314; ACC-72-5; TR-4) Avail: NTIS CSCL 13/10

The hydrodynamic problem is the design of submerged minimum drag axisymmetric vehicles for a specified enclosed volume and constant speed. Drag is to be minimized. Drag reduction is to be accomplished solely through manipulation of the vehicle shape. Other means of drag reduction, such as polymer injection into the boundary layer, are not considered. A drag model, valid for nonseparating flows, consists of computer programs available in the literature, representative of state-of-the-art drag prediction methods.
GRA

N72-32331# Naval Ship Research and Development Center, Bethesda, Md.
LAMINAR FLOW CIRCULATION IN A ROTATING TANK WITH A SPINNING COVER
Hans J. Lugt, Henry J. Haussling, and Samuel Ohring Feb. 1972 57 p refs
(AD-744238; NSRDC-3797) Avail: NTIS CSCL 20/4

A study has been made of axisymmetric incompressible fluid flows in a rotating tank when the angular speed of the cover changes abruptly. From the initial solid-body rotation a meridional and an azimuthal circulation relative to the moving tank develop. This problem is solved numerically by means of a stream function-vorticity formulation for the meridional flow. Local fine grids are used in the Ekman and Stewartson layers. No finite gap between tank and cover is considered. The singular behavior at this point is investigated. The parameters considered are the Rossby number, the Ekman number, and the ratio of height to radius of the tank. Temporal and spatial oscillations of the laminar flow field as well as the occurrence of cell flows are discussed.
Author (GRA)

13 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

N72-32332 Department of Energy, Mines and Resources, Ottawa (Ontario).
AN AMPLIFIER AND FILTER SYSTEM FOR TELLURIC SIGNALS Publications of the Earth Physics Branch, Volume 44, No. 1
D. Trigg 1972 9 p refs
Copyright. Avail: Issuing Activity

A high-performance amplifier and filter system is described which is very suitable for amplifying the variations of potential difference which occur between a pair of electrodes in the ground. Salient characteristics include a high impedance differential input, a bandpass characteristic with -3 db rolloff points at .0001 Hz and .1 Hz and low output drift.
Author

N72-32333*# Geological Survey, Menlo Park, Calif.
REMOTE SENSING OF PERMAFROST AND GEOLOGIC HAZARDS IN ALASKA Progress Report, 1 Jul. - 31 Aug. 1972
Oscar J. Ferrians, Jr., Principal Investigator 1 Sep. 1972 7 p Sponsored by NASA
(E72-10060; NASA-CR-128134) Avail: NTIS HC $3.00 CSCL 08L

There are no author-identified significant results in this report.

N72-32334*# Geological Survey, Washington, D.C.
THERMAL SURVEILLANCE OF VOLCANOES Progress Report, 1 Jul. - 31 Aug. 1972
Jules D. Friedman, Principal Investigator 1 Sep. 1972 7 p Sponsored by NASA
(E72-10061; NASA-CR-128135) Avail: NTIS HC $3.00 CSCL 08E

The author has identified the following significant results. A systematic aircraft program to monitor changes in the thermal emission from volcanoes of the Cascade Range has been initiated and is being carried out in conjunction with ERTS-1 thermal surveillance experiments. Night overflights by aircraft equipped with thermal infrared scanners sensitive to terrestrial emission in the 4-5.5 and 8-14 micron bands are currently being carried out at intervals of a few months. Preliminary results confirm that Mount Rainier, Mount Baker, Mount Saint Helens, Mount Shasta, and the Lassen area continue to be thermally active, although with the exception of Lassen which erupted between 1914 and 1917, and Mount Saint Helens which had a series of eruptions between 1831 and 1834, there has been no recent eruptive activity. Excellent quality infrared images recorded over Mount Rainier, as recently as April, 1972, show similar thermal patterns to those reported in 1964-1966. Infrared images of Mount Baker recorded in November 1970 and again in April 1972 revealed a distinct array of anomalies 1000 feet below the crater rim and associated with fumaroles or structures permitting convective heat transfer to the surface.

N72-32335*# Geological Survey, Menlo Park, Calif.
STUDIES OF THE INNER SHELF AND COASTAL SEDIMENTATION ENVIRONMENT OF THE BEAUFORT SEA FROM ERTS-1 Progress Report, 1 Jul. - 31 Aug. 1972
Erk Reimnitz, Principal Investigator 1 Sep. 1972 5 p Sponsored by NASA
(E72-10062; NASA-CR-128136) Avail: NTIS HC $3.00 CSCL 08J

The author has identified the following significant results. Field studies of the initiation of river flow onto the frozen Arctic Ocean were made by a group of scientists from May 15 to June 10, 1972. A time lapse camera mounted on a 40-ft. tower near the mouth of the Kaparuk River, west of Prudhoe Bay, provided a detailed 10-day record (24 hours a day) of flow direction and water level. It is believed that wind build-up, discharge variance of the river, and through-ice drainage rates are the prime factors influencing overflow onto the sea ice. Current meter, transmissometer, temperature, salinity, and thermoprobe data were collected from holes drilled in the shorefast ice from seal

holes and from the river water overflow. Depth and a real distribution of the overflow water were monitored from the ice using snowmobiles, and from the air using helicopters and fixed-wing aircraft. Photographic records were made on 35mm KII, KX, Ektachrome IR, Plus X, and IR black and white film. A simple two camera frame permitted simultaneous exposures of two types of film. Preliminary comparisons of the IR and conventional films, both color and black and white, showed no advantage to using the infrared film. However, the low altitude photography taken during this study will be very helpful in the interpretation of ERTS-1 imagery.

N72-32336*# Earth Satellite Corp., Washington, D.C.
STUDY OF APPLICATION OF ERTS-1 IMAGERY TO FRACTURE-RELATED MINE SAFETY HAZARDS IN THE COAL MINING INDUSTRY Progress Report, 1 Jul. - 1 Sep. 1972
Charles Wier, Principal Investigator (Indiana Geol. Surv., Bloomington), Frank J. Wobber, Principal Investigator, Orville R. Russell, and Roger Amato 1 Sep. 1972 3 p Sponsored by NASA
(E72-10064; NASA-CR-128080) Avail: NTIS HC $3.00 CSCL 08G

The author has identified the following significant results. Numerous fractures are identifiable on the 1:120,000 color infrared photography. Some of these fractures are in the proximity of operating open pit mines and should provide opportunities for field checking and confirmation.

N72-32337*# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
INVENTORY OF FOREST AND RANGELAND AND DETECTION OF FOREST STRESS Progress Report, 1 Jul. - 31 Aug. 1972
Robert C. Heller, Principal Investigator, Robert C. Aldrich, Frederick P. Weber, and Richard S. Driscoll 8 Sep. 1972 12 p (NASA Order S-70251-AG)
(E72-10070; NASA-CR-128085; FS-I-1; PR-1) Avail: NTIS HC $3.00 CSCL 02F

The author has identified the following significant results. Seventy-two ground sensors were interfaced with three DCP'S at the Black Hills test site. Unfortunately, the transmitters had to be returned for modification and forestry sensed data is not available. The DCP's did operate properly from the Berkeley laboratory and data were recovered from the Goldstone and Alaska stations via Goddard. Replicated training sets and test sets have been selected from all three test site areas in preparation for the receipt of ERTS imagery and digital tapes. From 600 and 800 points have been selected at each site location and UTM coordinates determined. Templates are being made of these sets. As of September 1, ERTS-generated data had not been received and no statements can be made regarding quality or suitability for forest and range experiments. Aerial photography (scale 1:32,000) of the Manitou (226 C) and Black Hills (226 A) sites was taken with CIR in June. Various scales (1:2,000; 1:10,000; 1:20,000; and 1:40,000) of 70 mm photographs were obtained at Manitou with normal color, CIR, and panchromatic in August.

N72-32338*# Stanford Univ., Calif. School of Earth Sciences.
STRUCTURAL AND LITHOLOGIC STUDY OF NORTHERN COAST RANGE AND SACRAMENTO VALLEY, CALIFORNIA Progress Report
Ernest I. Rich, Principal Investigator [1972] 2 p Sponsored by NASA
(E72-10074; NASA-CR-128089) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32339*# Wyoming Univ., Laramie. Dept. of Geology.
ANALYSIS OF ERTS-1 IMAGERY OF WYOMING AND ITS APPLICATION TO EVALUATION OF WYOMING'S NATURAL RESOURCES Progress Report, Jul. - Aug. 1972
Robert S. Houston, Principal Investigator and Ronald W. Marrs Sep. 1972 11 p
(Contract NAS5-21799)
(E72-10079; NASA-CR-128094) Avail: NTIS HC $3.00 CSCL 08G

The author has identified the following significant results. The major effort has been toward interpretation of the intermediate and high altitude aircraft data which was available. Project investigators were able to delineate various structures and lithologic units in well-exposed sedimentary sequences and in regions of Precambrian igneous and metamorphic rocks. In one area, the Precambrian lithologies, which were previously unmapped, include a taconite formation which might be economically important.

N72-32340*# Purdue Univ., Lafayette, Ind. Lab. for Application of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF ERTS DATA FOR COLORADO MOUNTAIN ENVIRONMENTS USING ADP TECHNIQUES Bimonthly Progress Report, 1 Jul. 1972 - 31 Aug. 1972
Roger M. Hoffer, Principal Investigator 31 Aug. 1972 4 p
(Contract NAS5-21880)
(E72-10081; NASA-CR-128096) Avail: NTIS HC $3.00 CSCL 08E

Author identified significant preliminary results from the Ouachita portion of the Texoma frame of data indicate many potentials in the analysis and interpretation of ERTS data. It is believed that one of the more significant aspects of this analysis sequence has been the investigation of a technique to relate ERTS analysis and surface observation analysis. At present a sequence involving (1) preliminary analysis based solely upon the spectral characteristics of the data, followed by (2) a surface observation mission to obtain visual information and oblique photography to particular points of interest in the test site area, appears to provide an extremely efficient technique for obtaining particularly meaningful surface observation data. Following such a procedure permits concentration on particular points of interest in the entire ERTS frame and thereby makes the surface observation data obtained to be particularly significant and meaningful. The analysis of the Texoma frame has also been significant from the standpoint of demonstrating a fast turn around analysis capability. Additionally, the analysis has shown the potential accuracy and degree of complexity of features that can be identified and mapped using ERTS data.

N72-32341*# Maine Dept. of Transportation, Augusta.
TO DEVELOP A LAND USE-PEAK RUNOFF CLASSIFICATION SYSTEM FOR HIGHWAY ENGINEERING PURPOSES Progress Report, period ending 30 Sep. 1972
Ernest G. Stoeckeler, Principal Investigator 1 Oct. 1972 2 p
(Contract NAS5-21772)
(E72-10088; NASA-CR-128137; PR-2) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32342*# Geological Survey, Washington, D.C.
CENTRAL ATLANTIC REGIONAL ECOLOGICAL TEST SITE: A PROTOTYPE REGIONAL ENVIRONMENT INFORMATION SYSTEM Progress Report, 1 Jul. - 31 Aug. 1972
Robert H. Alexander, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10089; NASA-CR-128138) Avail: NTIS HC $3.00 CSCL 08G

The author has identified the following significant results. Prior to the actual testing of data from ERTS-1, the principal scientific results to date are the establishment of a model or design for a regional land use information system based on remote sensor data and a firm establishment of the RB-57 type high altitude aircraft data base as an important tool in land use mapping. Preliminary user evaluations of the resulting land use

data have been favorable, and one of the states, Maryland, has adopted the USGS-GAP land use system as a first step towards mapping their entire state. The State is funding an extension (to the west) of the part of Maryland not covered by CARETS (Central Atlantic Regional Ecological Test Site), using the GAP land use classification and mapping procedures.

N72-32343*# Bureau of Land Management, Riverside, Calif.
PREDICT EPHEMERAL AND PERENNIAL RANGE QUANTITY AND QUALITY DURING NORMAL GRAZING SEASON Progress Report, 1 Jul. - 31 Aug. 1972
Gordon Bentley, Principal Investigator 1 Sep. 1972 2 p Sponsored by NASA
(E72-10090; NASA-CR-128139) Avail: NTIS HC $3.00 CSCL 04B

There are no author-identified significant results in this report.

N72-32344*# Bureau of Reclamation, Denver, Colo.
APPLICATION OF REMOTE SENSING TO SELECTED BUREAU OF RECLAMATION PROJECTS Progress Report, 1 Jul. - 31 Aug. 1972
Larry D. Cast, Principal Investigator 8 Sep. 1972 2 p Sponsored by NASA
(E72-10091; NASA-CR-128140) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32345*# Geological Survey, Washington, D.C. Topographic Div.
OVERALL EVALUATION OF ERTS IMAGERY FOR CARTOGRAPHIC APPLICATION Progress Report, 1 Jul. - 31 Aug. 1972
Alden P. Colvocoresses, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10092; NASA-CR-128141) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32346*# Geological Survey, St. Louis, Mo.
PERFORMANCE OF THE ERTS DATA COLLECTION SYSTEM IN A TOTAL SYSTEM CONTEXT Progress Report, 1 Jul. - 31 Aug. 1972
James F. Daniel, Principal Investigator 5 Sep. 1972 24 p Sponsored by NASA
(E72-10093; NASA-CR-128142) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N72-32347*# Geological Survey, Washington, D.C.
INVESTIGATION OF ERTS-1 IMAGES FOR APPLICATION TO THEMATIC MAPPING Progress Report, 1 Jul. - 31 Aug. 1972
Dean T. Edson, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10094; NASA-CR-128143) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32348*# Geological Survey, Menlo Park, Calif.
IDENTIFICATION OF GEOSTRUCTURES OF CONTINENTAL CRUST, PARTICULARLY AS THEY RELATE TO MINERAL-RESOURCE EVALUATION Progress Report, 1 Jul. - 31 Aug. 1972
George Gryc, Principal Investigator and Ernest H. Lathram Sep. 1972 4 p Sponsored by NASA
(E72-10095; NASA-CR-128144) Avail: NTIS HC $3.00 CSCL 08G

The authors have identified the following significant results. As a precursor to the ERTS-1 investigation, the spatial relationship of geostructures seen on Nimbus IDCS photographs to the distribution of mineralized areas in Alaska and western Canada was analyzed to determine the possible metallogenic significance of the geostructures. In Canada, mercury and porphyry molybdenum deposits are closely associated with strong northwest-trending fault systems; the development of mineralized regions seems related to major crustal zones or fractures trending southwestward across the Cordillera from the Precambrian shield. In Alaska, comparison of the northeast- and northwest-trending set of possible crustal structures shown on the Nimbus photo, with the distribution of known mineral deposits suggests a similar relationship. The mineralized region of massive sulfides in Prince William Sound and upper Copper River areas and of porphyry coppers in the Nabesna area forms a broad northeast-trending belt possibly related to the Minto Arch on the Shield. The belt of metalliferous deposits in the western Alaska Range follows a comparable northeast trend. Mercury deposits, suggested by many to be fault-controlled, together with most tin and tungsten deposits, occupy a northeast-trending belt between the Bristol Bay-Mackenzie Bay linear and extensions of a linear along the lower Yukon River. This belt intersects the northwest-trending Canadian belt of similar deposits in the Fairbanks area.

N72-32349*# Geological Survey, Baltimore, Md.
INVESTIGATION OF BASIN CHARACTERISTICS EXTRACTED FROM ERTS DATA FOR IMPROVING REGRESSION ESTIMATES OF STREAMFLOW Progress Report, 1 Jul. - 31 Aug. 1972
Este F. Hollyday, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10096; NASA-CR-128145) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32350*# Geological Survey, Corpus Christi, Tex.
MONITORING CHANGING GEOLOGIC FEATURES ALONG THE TEXAS GULF COAST Progress Report, 1 Jul. - 31 Aug. 1972
Ralph E. Hunter, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10097; NASA-CR-128146) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32351*# Geological Survey, McLean, Va. Topographic Div.
MAN-MADE CULTURE INTERPRETATION AND CULTURE REVISION OF SMALL SCALE MAPS Progress Report, 1 Jul. - 31 Aug. 1972
William J. Kosco, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10098; NASA-CR-128147) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32352*# Geological Survey, Washington, D.C.
THE UTILIZATION OF ERTS-1 GENERATED PHOTOGRAPHS IN THE EVALUATION OF THE IRANIAN PLAYAS AS POTENTIAL LOCATIONS FOR ECONOMIC AND ENGINEERING DEVELOPMENT Progress Report, 1 Jul. - 31 Aug. 1972
Daniel B. Krinsley, Principal Investigator 1 Sep. 1972 2 p Sponsored by NASA
(E72-10099; NASA-CR-128148) Avail: NTIS HC $3.00 CSCL

08F

There are no author-identified significant results in this report.

N72-32353*# Geological Survey, McLean, Va.
CARTOGRAPHIC EVALUATION OF ERTS ORBIT AND ATTITUDE DATA Progress Report, 1 Jul. - 31 Aug. 1972
Robert B. McEwen, Principal Investigator 1 Sep. 1972 3 p
Sponsored by NASA
(E72-10100; NASA-CR-128149) Avail: NTIS HC $3.00 CSCL 08B

The author has identified the following significant results. The low geometric distortion of the RBV bulk images will greatly simplify the register of multispectral images and the reference of the scene to published maps. Preparation of photomaps at scales larger than 1:1,000,000 also appears possible.

N72-32354*# Geological Survey, Denver, Colo.
A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA AND AUSTRALIA Progress Report, 1 Jul. 31 Aug. 1972
Edwin D. McKee, Principal Investigator 1 Sep. 1972 3 p
Sponsored by NASA
(E72-10101; NASA-CR-128150) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32355*# Geological Survey, Washington, D.C.
THE CARTOGRAPHIC APPLICATION OF ERTS/RBV IMAGERY IN POLAR REGIONS Progress Report, 1 Jul. - 31 Aug. 1972
William R. MacDonald, Principal Investigator 1 Sep. 1972 3 p
Sponsored by NASA
(E72-10102; NASA-CR-128151) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32356*# Geological Survey, Tacoma, Wash.
EVALUATE ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS Progress Report, 1 Jul. - 31 Aug. 1972
Mark F. Meier, Principal Investigator 15 Aug. 1972 3 p
Sponsored by NASA
(E72-10103; NASA-CR-128152) Avail: NTIS HC $3.00 CSCL 08L

There are no author-identified significant results in this report.

N72-32357*# Geological Survey, Denver, Colo.
1 TEST AND EVALUATION OF ERTS-A DATA APPLICATIONS TO A PRESENT STATUS INVENTORY OF THE POST-1890 AD EPISODE OF ACCELERATED EROSION, AND TO MONITORING FUTURE EROSIONAL CHANGES, WITH SPECIFIC REFERENCE TO THE ARIZONA REGIONAL ECOLOGICAL TEST SITE Progress Report, 1 Jul. - 31 Aug. 1972
Roger B. Morrison, Principal Investigator 1 Sep. 1972 2 p
Sponsored by NASA
(E72-10104; NASA-CR-128153) Avail: NTIS HC $3.00 CSCL 08M

There are no author-identified significant results in this report.

N72-32358*# Bureau of Sport Fisheries and Wildlife, Jamestown, N.D.
APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Progress Report, 1 Jul. - 31 Aug. 1972
Harvey K. Nelson, Principal Investigator 1 Sep. 1972 3 p
Sponsored by NASA
(E72-10106; NASA-CR-128155) Avail: NTIS HC $3.00 CSCL 06C

There are no author-identified significant results in this report.

N72-32359*# Geological Survey, Harrisburg, Pa.
NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT Progress Report, 1 Jul. - 31 Aug. 1972
Richard W. Paulson, Principal Investigator 7 Sep. 1972 5 p
Sponsored by NASA
(E72-10107; NASA-CR-128156) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32360*# Geological Survey, McLean, Va.
INVESTIGATION OF ERTS/RBV IMAGERY FOR PHOTOMAPPING OF THE UNITED STATES Progress Report, 1 Jul. - 31 Aug. 1972
Joseph T. Pilonero, Principal Investigator 1 Sep. 1972 3 p
Sponsored by NASA
(E72-10108; NASA-CR-128157) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32361*# Geological Survey, Washington, D.C.
LAND USE MAPPING AND MODELING FOR THE PHOENIX QUADRANGLE Progress Report, 1 Jul. - 31 Aug. 1972
John L. Place, Principal Investigator 1 Sep. 1972 3 p
Sponsored by NASA
(E72-10109; NASA-CR-128159) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32362*# Geological Survey, Arlington, Va.
DYNAMICS OF SUSPENDED SEDIMENT PLUMES IN LAKE ONTARIO Progress Report, 1 Jul. - 31 Aug. 1972
Edward J. Pluhowski, Principal Investigator 1 Sep. 1972 2 p
Sponsored by NASA
(E72-10110; NASA-CR-128158) Avail: NTIS HC $3.00 CSCL 08J

There are no author-identified significant results in this report.

N72-32363*# Geological Survey, Washington, D.C.
IRON ABSORPTION BAND ANALYSIS FOR THE DISCRIMINATION OF IRON RICH ZONES Progress Report, Aug. 1972
Lawrence C. Rowan, Principal Investigator 8 Sep. 1972 2 p
Sponsored by NASA
(E72-10111; NASA-CR-128160) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32364*# Geological Survey, Lakewood, Colo.
DETERMINE THE UTILITY OF ERTS-1 IMAGERY IN THE PREPARATION OF HYDROLOGIC ATLASES OF ARID LAND WATERSHEDS Progress Report, 1 Jul. - 31 Aug. 1972
Lynn M. Shown, Principal Investigator 1 Sep. 1972 2 p
Sponsored by NASA
(E72-10113; NASA-CR-128162) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32365*# Geological Survey, Tucson, Ariz.
DYNAMICS OF DISTRIBUTION AND DENSITY OF PHREATOPHYTES AND OTHER ARID LAND PLANT COMMUNITIES Progress Report, 1 Jul. - 31 Aug 1972
Raymond M. Turner, Principal Investigator 1 Sep. 1972 2 p Sponsored by NASA
(E72-10114; NASA-CR-128163) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32366*# Bureau of Sport Fisheries and Wildlife, Washington, D.C.
AN EVALUATION OF SPACE ACQUIRED DATA AS A TOOL FOR MANAGEMENT OF WILDLIFE HABITAT IN THE STATE OF ALASKA Progress Report, 1 Jul. - 31 Aug. 1972
Billy J. VanTries, Principal Investigator 1 Sep. 1972 3 p Sponsored by NASA
(E72-10115; NASA-CR-128164) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32367*# Bureau of Indian Affairs, Washington, D.C.
TIMBER RESOURCE INFORMATION SYSTEM Progress Report, 1 Jul. - 31 Aug. 1972
Arthur M. Woll, Principal Investigator 5 Sep. 1972 2 p Sponsored by NASA
(E72-10116; NASA-CR-128165) Avail: NTIS HC $3.00 CSCL 02F

There are no author-identified significant results in this report.

N72-32368*# Purdue Univ., Lafayette, Ind.
PRELIMINARY RESULTS ON AUTOMATIC IDENTIFICATION OF FOREST AND AGRICULTURAL COVER TYPES UTILIZING ERTS-1 DATA OVER THE WABASH RIVER BASIN
Roger M. Hoffer, Principal Investigator and David A. Landgrebe, Principal Investigator 3 Oct. 1972 2 p
(E72-10118; NASA-CR-128167) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32369*# Delaware Univ., Newark. Coll. of Marine Studies.
APPLICABILITY OF ERTS-1 SATELLITE IMAGERY TO THE STUDY OF COASTAL PROCESSES
V. Klemas, Principal Investigator 4 Oct. 1972 3 p Sponsored by NASA
(E72-10119; NASA-CR-128168) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32370*# Delaware Univ., Newark. College of Marine Studies.
IDENTIFICATION OF COASTAL VEGETATION SPECIES IN ERTS-1 IMAGERY
V. Klemas, Principal Investigator and D. Bartlett 4 Oct. 1972 2 p Sponsored by NASA
(E72-10120; NASA-CR-128169) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32371*# Wolf Research and Development Corp., Riverdale, Md.
THE INTERDEPENDENCE OF LAKE ICE AND CLIMATE IN CENTRAL NORTH AMERICA Progress Report
Allan Jelacic, Principal Investigator 4 Oct. 1972 7 p (Contract NAS5-21761)
(E72-10121; NASA-CR-128170) Avail: NTIS HC $3.00 CSCL 08L

There are no author-identified significant results in this report.

N72-32372*# Kansas Univ., Lawrence. Remote Sensing Lab.
GROUND PATTERN ANALYSIS IN THE GREAT PLAINS Bimonthly Progress Report
Dwight Egbert, John C. Davis, Principal Investigator, and Fawwaz T. Ulaby 30 Sep. 1972 7 p Sponsored by NASA
(E72-10122; NASA-CR-128176) Avail: NTIS HC $3.00 CSCL 08H

The author has identified the following significant results. During preliminary analysis of the ERTS-1 RBV band-2 images it was possible to detect many geologic features and to delineate several geologic formation boundaries. Also, the spatial frequency characteristics of some different geologic formations are distinguishable from each other. At the present time there is not enough data to provide any statistical evaluation of these differences, but it is hoped that more quantitative results will be produced within the next few months. Multispectral analysis will begin when the retrospective order for the other spectral bands of the first images is received. Since many geologic formation boundaries are visible on the single band that has been analyzed so far, even greater visibility is expected with the spectral information available in the additional bands.

N72-32373*# Kansas Univ., Lawrence. Space Technology Labs.
MONITORING FRESH WATER RESOURCES Bimonthly Progress Report, period ending 30 Sep. 1972
Harold L. Yarger, Principal Investigator 30 Sep. 1972 22 p refs Sponsored by NASA
(E72-10123; NASA-CR-128177) Avail: NTIS HC $3.25 CSCL 08H

The author has identified the following significant results. ERTS-1 imagery is promising to be very useful for studying reservoir turbidity patterns. Initial coverage indicates a strong qualitative correlation between film density and turbidity. With repeated coverage and sampling the possibility of developing a reliable quantitative correlation looks good. The question of distinguishing between organic and inorganic suspended loads in Kansas reservoirs is open, but will require considerable more work to answer.

N72-32374*# Kansas State Univ., Manhattan.
WHEAT: IT'S WATER USE, PRODUCTION AND DISEASE DETECTION AND PREDICTION Progress Report
Edwart T. Kanemasu, Principal Investigator 22 Sep. 1972 3 p (Contract NAS5-21822)
(E72-10126; NASA-CR-128180) Avail: NTIS HC $3.00 CSCL 02D

There are no author-identified significant results in this report.

N72-32375*# Kansas Univ., Lawrence.
APPLICATION OF ERTS DATA TO KANSAS AGRICULTURE Monthly Progress Report, Sep. 1972
Stanley A. Morain, Principal Investigator Oct. 1972 5 p Sponsored by NASA
(E72-10127; NASA-CR-128181) Avail: NTIS HC $3.00 CSCL 02B

There are no author-identified significant results in this report.

N72-32376*# Alaska Univ., College.
FEASIBILITY STUDY FOR LOCATING ARCHAEOLOGICAL VILLAGE SITES BY SATELLITE REMOTE SENSING

TECHNIQUES Bimonthly Progress Report
John P. Cook, Principal Investigator 30 Sep. 1972 4 p Sponsored by NASA
(E72-10128; NASA-CR-128182; BMPR-1) Avail: NTIS HC $3.00 CSCL 08B

The author has identified the following significant results. As a result of ground truth activities, the accurate geographic location of an old fish camp was established as 64 deg 12 min 38 sec N, 158 deg 30 min 42 sec W. Previously the location of this very large abandoned village site was given only on a map sketched in 1935. This location and two other nearby sites will be used as ERTS training areas.

N72-32377*# Alaska Univ., College.
GLACIOLOGICAL AND VOLCANOLOGICAL STUDIES ON THE WRANGELL MOUNTAINS, ALASKA Bimonthly Progress Report
Carl S. Benson, Principal Investigator 30 Sep. 1972 2 p Sponsored by NASA
(E72-10129; NASA-CR-128183; BMPR-1) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32378*# Alaska Univ., College.
EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA Bimonthly Progress Report
Larry Gedney, Principal Investigator 5 Oct. 1972 2 p Sponsored by NASA
(E72-10130; NASA-CR-128184; BMPR-1) Avail: NTIS HC $3.00 CSCL 08K

There are no author-identified significant results in this report.

N72-32379*# Alaska Univ., College. Dept. of Geology.
ERTS-1 DATA AS A TEACHING AND RESEARCH TOOL IN THE DEPARTMENT OF GEOLOGY Bimonthly Progress Report
Donald Grybeck, Principal Investigator 30 Sep. 1972 2 p Sponsored by NASA
(E72-10131; NASA-CR-128185; BMPR-1) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32380*# Alaska Univ., College.
CIRCULATION OF PRINCE WILLIAM SOUND Bimonthly Progress Report
Robin D. Muench, Principal Investigator 30 Sep. 1972 2 p Sponsored by NASA
(E72-10132; NASA-CR-128186; BMPR-1) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32381*# Alaska Univ., College.
SEA, ICE AND SURFACE WATER CIRCULATION, ALASKAN CONTINENTAL SHELF Bimonthly Progress Report
Frederick F. Wright, Principal Investigator and G. D. Sharma 30 Sep. 1972 2 p Sponsored by NASA
(E72-10133; NASA-CR-128187; BMPR-1) Avail: NTIS HC $3.00 CSCL 08H

There are no author-identified significant results in this report.

N72-32382*# Alaska Univ., College.
APPLICATION OF ERTS-1 IMAGERY TO THE STUDY OF CARIBOU MOVEMENTS AND WINTER DISPERSAL IN RELATION TO PREVAILING SNOWCOVER Bimonthly Progress Report
Peter C. Lent, Principal Investigator 30 Sep. 1972 3 p Sponsored by NASA
(E72-10134; NASA-CR-128188; BMPR-1) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32383*# Alaska Univ., College. Inst. of Water Resources.
BREAK-UP CHARACTERISTICS OF CHENA RIVER BASIN Bimonthly Progress Report
Robert F. Carlson, Principal Investigator 30 Sep. 1972 3 p Sponsored by NASA
(E72-10135; NASA-CR-128189; BMPR-1) Avail: NTIS HC $3.00 CSCL 08L

There are no author-identified significant results in this report.

N72-32384*# Alaska Univ., College.
SURVEY OF THE SEASONAL SNOW COVER OF ALASKA Bimonthly Progress Report
Gunter E. Weller, Principal Investigator 30 Sep. 1972 2 p Sponsored by NASA
(E72-10136; NASA-CR-128190; BMPR-1) Avail: NTIS HC $3.00 CSCL 08L

There are no author-identified significant results in this report.

N72-32385*# Alaska Univ., College.
IDENTIFICATION DEFINITION AND MAPPING OF TERRESTRIAL ECOSYSTEMS IN INTERIOR ALASKA Bimonthly Progress Report
James H. Anderson, Principal Investigator 30 Sep. 1972 2 p Sponsored by NASA
(E72-10137; NASA-CR-128191; BMPR-1) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

N72-32386*# Alaska Univ., College.
IDENTIFICATION OF PHENOLOGICAL STAGES AND VEGETATIVE TYPES FOR LAND USE CLASSIFICATION Bimonthly Progress Report
C. Ivan Branton, Principal Investigator 30 Sep. 1972 2 p Sponsored by NASA
(E72-10138; NASA-CR-128192; BMPR-1) Avail: NTIS HC $3.00 CSCL 08F

There are no author-identified significant results in this report.

N72-32387*# Geological Survey, Washington, D.C.
STUDY OF MULTISPECTRAL DATA, ERTS-A, NORTHWEST SAUDI ARABIA Progress Report, 1 Jul. - 31 Aug. 1972
Alfred J. Bodenlos, Principal Investigator 1 Sep. 1972 2 p Sponsored by NASA
(E72-10140; NASA-CR-128209) Avail: NTIS HC $3.00 CSCL 05B

There are no author-identified significant results in this report.

N72-32388*# Montana Univ., Missoula. Dept. of Geology.
APPLICABILITY OF ERTS-A TO MONTANA GEOLOGY Progress Report, period ending 30 Sep. 1972
Robert M. Weidman, Principal Investigator 9 Oct. 1972 7 p (Contract NAS5-21826)
(E72-10141; NASA-CR-128210) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32389*# Delaware Univ., Newark. Coll. of Marine Studies.
APPLICATION OF ECOLOGICAL, GEOLOGICAL AND OCEANOGRAPHIC ERTS-1 IMAGERY TO DELAWARE'S COASTAL RESOURCES PLANNING Progress Report, Sep. - Oct. 1972
V. Klemas, Principal Investigator 18 Oct. 1972 10 p Sponsored by NASA
(E72-10142; NASA-CR-128211) Avail: NTIS HC $3.00 CSCL 08A

The author has identified the following significant events. Coastal vegetation species appearing in the ERTS-1 image taken of the Southern Coast of Delaware, during orbit 333 on August 16, 1972, have been correlated with ground truth vegetation maps, and imagery obtained from high altitude RB-57 and U-2 overflights. The vegetation maps of the entire Delaware Coast were prepared using data collected on foot, in small boats, and from low altitude aircraft. Multispectral analysis of high altitude RB-57 and U-2 photographs indicated that five vegetation species could be clearly discriminated from 60,000 feet altitude, including: (1) salt marsh cord grass (Spartina alterniflora); (2) salt marsh hay and spike grass (Spartina patens and Distichlis spicata); (3) reed grass (Phragmites communis); (4) high tide bush and sea myrtle (Iva species and Baccharus halimifolia); and (5) a group of fresh water species found in impounded areas built to attract water fowl. Major Spartina alterniflora and Spartina patens communities within the tidal marshes can be identified in the ERTS-1 imagery. Phragmites, and other species however, occur in smaller, more dispersed groupings and are difficult to discriminate within the resolution capability of the ERTS-1 scanner. Similarly, major impounded areas, built to attract water fowl can be detected; however, mosquito drainage ditches, covering many of Delaware's marshes, are too narrow and not long enough to be resolved by ERTS-1 sensors. High-marsh and dune communities dominated by high tide bush (Iva frutescens) and sea myrtle (Baccharus halimifolia) can be distinguished from adjacent maritime forest and beach grass communities.

N72-32390*# Lockheed Missiles and Space Co., Palo Alto, Calif. Research Lab.
VARIATIONS OF ATMOSPHERIC DENSITY NEAR 400 km WITH MAGNETIC ACTIVITY DURING THE STORM PERIOD OF 28 SEPTEMBER TO 2 OCTOBER 1969
Albert D. Anderson Apr. 1972 38 p refs
(Contract NAS5-9334)
(NASA-CR-122479; LMSC/D266900) Avail: NTIS HC $4.00 CSCL 04A

Neutral density data were obtained near 400 km (1600 LT) from a microphone density gage on OGO-6 from 0 to 40 deg N geomagnetic latitude for 25 September through 3 October 1969. Several geomagnetic storms occurred during this period. Least squares fits were made to data points on density scatter diagrams. An equation representing the least squares fit was computed for each delay time. The equation of best fit (and the corresponding time delay between the density and the magnetic index which resulted in this best fit) was found by choosing the equation that gave the minimum standard error. The implications of the time differences associated with the best fits at various latitudes and longitudes are discussed with regard to the time delays involved in geomagnetic heating of the neutral upper atmosphere. Author

N72-32391*# Pennsylvania State Univ., University Park. Ionosphere Research Lab.
THEORETICAL STUDY OF THE IONOSPHERIC G FACTOR
Keith M. Hagenbuch 31 Mar. 1972 46 p refs
(Grants NGR-39-009-095; NGL-39-009-003)
(NASA-CR-130059; SR-390; PSU-IRL-SCI-390) Avail: NTIS HC $4.50 CSCL 04A

A derivation from kinetic theory of the energy balance equation used in wave interaction work is reviewed. Then G is defined and two models for G are presented: one, a model based on Gerjuoy-Stein cross sections for both O2 and N2; the other based on a more recent model for O2 cross sections. The two models differ considerably in their temperature dependence. The limits of applicability of the useful energy balance equation (hence of the concept of G) are discussed and it is found that no difficulty arises unless the transmitter power is more than 1000 times that now employed at the present operating frequency. Author

N72-32392# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON EASTERN EUROPE SCIENTIFIC AFFAIRS, NO. 243
17 May 1972 34 p refs Transl. into ENGLISH from Hungarian and Polish reports
(JPRS-56024) Avail: NTIS HC $3.75

The accuracy of redetermining geodetic grid positions when points of the grid are damaged is analyzed. Regular angular-linear grids are considered. The most efficient methods of redetermining points are briefly described; these are the crossed tacks method, ranging method, polar method, a combination of these three, and the resection method. An expression for calculating the mean error is derived, and the accuracy of each of the above methods is discussed. An article containing descriptions of a plant for extracting aromatic hydrocarbons and preliminary results is also presented, and an agreement designating coordination of scientific policies and cooperation among scientists in Hungary is mentioned. N.E.N.

N72-32393*# Translation Consultants, Ltd., Arlington, Va.
HEAT BALANCE OF AGRICULTURAL SOILS
R. H. A. VanDuin Washington NASA Sep. 1972 13 p refs Transl. into ENGLISH from Landbouwk. Tijdschr. (The Hague), v. 72, no. 5, Mar. 1960 p 146-155
(Contract NASW-2038)
(NASA-TT-F-14511) Avail: NTIS HC $3.00 CSCL 08M

Various heat balance factors in agricultural soil, such as thermal characteristics, thermal distribution at the surface, and reaction of plants to temperatures are described. The effect which agricultural and cultivation-technical measures have on soil temperature is discussed. Author

N72-32394*# Translation Consultants, Ltd., Arlington, Va.
SELENE
Ion Sain Washington NASA Aug. 1972 30 p ref Transl. into ENGLISH of "Selena," Capitolul Geneza, unpublished manuscript, Cimpulung, Rumania, May 1972 54 p
(Contract NASw-2038)
(NASA-TT-F-14513) Avail: NTIS HC $3.50 CSCL 03B

Hypotheses of the genesis of the moon and relationships with other celestial bodies such as comets and planets are presented. K.P.D.

N72-32395*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE DISTRIBUTION OF NO2(PLUS) IN THE LOWER IONOSPHERE
A. C. Aiken and R. A. Goldberg Sep. 1972 10 p refs Submitted for Publication
(NASA-TM-X-66024; X-625-72-338) Avail: NTIS HC $3.00 CSCL 04A

Data on the NO2(+)(46 AMU) were obtained with a rocket-borne quadrupole ion mass spectrometer. The ion 46(+) is most prevalent in the vicinity of 90 km and is always observed in the presence of 48(+), identified as NO(+)-H2O. The observed concentrations of O(+)(16), O2(+)(32), NO2(+)(46), NO(+)-H2O(48), electrons, and the ratio 48(+)/46(+) are tabulated for altitudes from 87.8 to 93.2 km. Reactions governing the distribution of NO2(+) are brifly discussed, and it is felt that photoionization and charge exchange reactions are insufficient to account for the NO2(+) concentration at 90 km. N.E.N.

N72-32396# Academy of Sciences (USSR), Moscow.
COSMIC DATA. MONTHLY REVIEW NO. 10, OCTOBER 1971
1972 52 p In ENGLISH and RUSSIAN
Avail: NTIS HC $4.75

The results of observations are presented for geophysical phenomena concerning electric and magnetic field states of the atmosphere (geomagnetic variations, ionospheric, cosmic rays, and telluric currents). Solar activity data are also given. Author

N72-32397*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DEFORMATION AND INSTABILITY OF UNDERTHRUSTING LITHOSPHERIC PLATES
Han-Shou Liu Aug. 1972 19 p refs Presented at Intern. Union of Geophys. and Geodesy, 9th Ann. Symp. on Geophys. Theory and Computers, Banff, Can., 24-31 Aug. 1972 Submitted for publication
(NASA-TM-X-66028; X-553-72-273) Avail: NTIS HC $3.00 CSCL 08K

Models of the underthrusting lithosphere are constructed for the calculation of displacement and deflection. First, a mathematical theory is developed that rigorously demonstrates the elastic instability in the decending lithosphere. The theory states that lithospheric thrust beneath island arcs becomes unstable and suffers deflection as the compression increases. Thus, in the neighborhood of the edges where the lithospheric plate plunges into the asthenosphere and mesosphere its shape will be contorted. Next, the lateral displacement is calculated, and it is shown that, before contortion, the plate will thicken and contract at different positions with the variation in thickness following a parabolic profile. Finally, the depth distribution of the intermediate and deep focus earthquakes is explained in terms of plate buckling and contortion. Author

N72-32398*# Techtran Corp., Glen Burnie, Md.
SOIL TEMPERATURE CONDITIONS ON A CENTRAL ALPINE SLOPE ON BOTH SIDES OF THE TIMBERLINE. PART 3: SOIL TEMPERATURE IN RELATIONSHIP TO OTHER CLIMATIC FACTORS
Herbert Aulitsky Washington NASA Sep. 1972 17 p refs Transl. into ENGLISH from Arch. Meteorol. Geophys. Bioklimatol., Ser. B (Vienna), v. 2, no. 3, 1962 p 363-376
(Contract NASw-2037)
(NASA-TT-F-14323) Avail: NTIS HC $3.00 CSCL 08M

The correlation between soil surface temperature, soil temperature, and other climatic elements, and the differences in these correlations between mountainous and plain regions were investigated. With equal duration of sunshine, the amplitudes of surface temperature variations are greater at high altitude. The same holds for the relation between surface temperature and cloudiness. The relation between air temperature and soil temperature shows great local variations. Author

N72-32399*# Scientific Translation Service, Santa Barbara, Calif.
WHAT GRAVITY TELLS US
Kurt Lambeck and Francois Barlier Washington NASA Sep. 1972 25 p refs Transl. into ENGLISH from Sci. Progr. Decouverte (France), Nov. 1971 p 24-33
(Contract NASw-2035)
(NASA-TT-F-14546) Avail: NTIS HC $3.25 CSCL 08N

The use of satellites to determine magnetic anomalies in the structure of the earth and the application to measuring the gravitational field are discussed. The causes of anomalies are related to the accepted structure of the earth and the viscosity of the earth mantle. The correlation between the distribution of gravity anomalies and the tectonic features of the earth is examined. The benefits derived by other sciences from satellite observations are described. P.N.F.

N72-32400*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TRANSITION REGION RESPONSE OF THE SYMMETRIC DOUBLE PROBE AND ITS APPLICATION IN THE LOWER IONOSPHERE
Edward P. Szuszczewicz Jul. 1972 23 p refs Submitted for publication
(NASA-TM-X-66013; X-625-72-219) Avail: NTIS HC $3.25 CSCL 04A

The technique is discussed of the symmetric double-probe which readily lends itself to the in situ measurement of plasma temperature in the ionospheric D-region because it can lead to meaningful results under relatively high collision frequencies where the Langmuir probe has been observed to fail. It is shown that the modification to the original collision-free double-probe theory of Johnson and Malter for the determination of electron temperature is never greater than + or - 12%, with a value of (8 + or - 2)% nominally applicable in the case of D-region diagnostics. This technique was successfully operated on a Nike-Cajun payload flown at mid-day from White Sands, New Mexico to an apogee of 78.5 km. The associated electronics and deployed double-probe configuration are presented, and a current-voltage characteristic collected in the ascent stage at 73.7 km is briefly discussed. The values of electron temperature indicated by the sampled data are approximately 30% higher than those predicted by theory for the anticipated state of thermal equilibrium with the ambient neutrals. Author

N72-32401*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DETERMINATION OF THE GEOID FROM SATELLITE ALTIMETER DATA
R. D. Brown (Computer Sciences Corp.) Sep. 1972 63 p refs (Contract NAS5-11790)
(NASA-TM-X-66016; X-550-72-268) Avail: NTIS HC $5.25 CSCL 22C

The characteristics of the geoid surface are quantitatively described. A procedure for calculating the satellite altitude is developed. Error sources are described quantitatively, mathematically modeled, and evaluated in computer simulation. Procedures for maximum likelihood processing of altimeter data for recovery of orbit and geopotential information are presented for several geopotential models. Author

N72-32402*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH ZONAL HARMONICS FROM RAPID NUMERICAL ANALYSIS OF LONG SATELLITE ARCS
Carl A. Wagner Aug. 1972 36 p refs Submitted for publication
(NASA-TM-X-66039; X-553-72-341) Avail: NTIS HC $4.00 CSCL 04A

A zonal geopotential is presented to degree 21 from evaluation of mean elements for 21 satellites including 2 of low inclination. Each satellite is represented by an arc of at least one apsidal rotation. The lengths range from 200 to 800 days. Differential correction of the initial elements in all of the arcs, together with radiation pressure and atmospheric drag coefficients, was accomplished simultaneously with the correction for the zonal harmonics. The satellite orbits and their variations are generated by numerical integration of the Lagrange equations for mean elements. Disturbances due to precession and nutation of the earth's pole, atmospheric drag, radiation pressure and luni-solar gravity are added at from 1- to 8-day intervals in the integrated orbits. The results agree well with recent solutions from other authors using different methods and different satellite sets. Author

N72-32403# Bureau of Meteorology, Melbourne (Australia).
OCEAN WAVES AT PORT PHILLIP HEADS Meteorological Summary Report
R. L. Falconer Apr. 1972 145 p refs
Avail: NTIS HC $9.25

The effect of refraction, shoaling, and friction on ocean waves reaching Port Phillip Heads were computed. Deep water wave characteristics computed for the point lat. 39 deg S, long. 145 deg E, for a period of 15 years (1951 to 1965) were

converted to wave characteristics at the entrance to the ship channel through the Heads by applying corrections for these shallow water effects. Statistical summaries of wave heights, periods and directions, and their variation with time of year are presented in tables and diagrams. Author

N72-32404# Bureau of Meteorology, Melbourne (Australia).
DEEP WATER WAVES AND SWELL STATE IN BASS STRAIT Meteorological Summary Report
K. T. Spillane, R. L. Falconer, and D. S. Wright Apr. 1972 103 p refs
Avail: NTIS HC $7.25

The relationships between significant wave height and period, (a measure of the spectrum of sea surface wave energy resulting from wind action) and the wind field characteristics of fetch, duration, and speed, which can be derived from synoptic weather charts, were employed as the theoretical basis of determining sea state in Bass Strait for the 15-year period 1951 to 1965 inclusive. Author

N72-32405*# Kanner (Leo) Associates, Redwood City, Calif.
GEOTHERMOGRAPH AND METEOROPHYTOGRAPH
Iasi St. Savin Washington NASA Feb. 1972 8 p Transl. into ENGLISH of "Geotermograf si Meteorofitograf" Bucharest, Inst. Meteorol., Culegere de Lucrari, 1968 p 499-503
(NASA-TT-F-14469) Avail: NTIS HC $3.00 CSCL 08G

Two devices are discussed for automating agrometeorological observations. Their operating principles and the field of implementation are presented. The instruments include a geothermograph for continuous recording of soil temperature at various depths and a meteorophytograph, a device used for studying the phytoclimate (air and soil thermal regions, air moisture regions, atmospheric precipitations, and plant growth rate, measured in two dimensions). Author

N72-32406*# Kanner (Leo) Associates, Redwood City, Calif.
USE OF INFRARED AERIAL PHOTOGRAPHY IN DETECTING AREAS WITH EXCESS SURFACE WATER AND GROUND WATER OUTFLOWS
B. V. Shilin, N. A. Gusev, and Ye. Ya. Karizhenskiy Washington NASA Jun. 1972 12 p refs Transl. into ENGLISH from Sov. Geol. (Moscow), no. 1, 1971 p 155-160
(NASA-TT-F-14461) Avail: NTIS HC $3.00 CSCL 08H

Applications of aerial photography to hydrogeological studies are considered. The advantages of using infrared aerial photography are also discussed. K.P.D.

N72-32407*# National Aeronautics and Space Administration, Washington, D.C.
CHECKING AND ANALYZING SOIL TEMPERATURE MEASUREMENTS. PART 1: TESTING RESULTS WITH THE AID OF TAUTOCHRONE PLOTS
O. Eckel Jun. 1972 9 p Transl. into ENGLISH from Wetter Leben (Austria), v. 12, no. 3 and 4, 1960 p 63-69
(NASA-TT-F-14479) Avail: NTIS HC $3.00 CSCL 08M

The use and calibration of thermometers used for soil temperature measurement are discussed. Systematic error analysis is best checked using the soil temperature versus depth curve for three observation times. The method consists of plotting average values of soil temperature in the form of tautochrones for every month and for at least two reading times (7 a.m. and 2 p.m.) and estimating the correctness of the measured curves with the aid of similar curves from a standard station. By interpolating the intermediate depths or extrapolating the boundary values, the results can be corrected. K.P.D.

N72-32408*# National Aeronautics and Space Administration, Washington, D.C.
ON THE PROBLEM OF TECHNIQUES FOR MEASURING SOIL SURFACE TEMPERATURES
S. A. Smirnov Jun. 1972 12 p refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), no. 230, 1968 p 92-98
(NASA-TT-F-14471) Avail: NTIS HC $3.00 CSCL 08M

Comparative observations according to standard liquid thermometers and resistance thermometers were conducted on a meteorological area of the Oasis Antarctic station. The soil at station Oasis allowed an area to be cleaned off on which it was possible to set up the compared thermometers under identical conditions. A series of readings was obtained at different times during a 10-day period which allowed selection of the most reliable thermometers for subsequent comparative observations with resistance thermometers. Tables of data are presented to show the performance of both types of thermometers. Author

N72-32409*# National Aeronautics and Space Administration, Washington, D.C.
KEPLERIAN MOVEMENT AND HARMONIC OSCILLATORS
Claude A. Burdet Jun. 1972 21 p refs Transl. into ENGLISH from Z. fuer die Reine und Angew. Mat. (Switzerland), v. 238, 1969 p 71-84
(NASA-TT-F-14422) Avail: NTIS HC $3.25 CSCL 08M

A brief presentation of the method of regularization is given. A transformation of time t furnishes another harmonic oscillator whose principle advantage is to eliminate the $1/r$ singularity which appears with certain disturbing forces (especially those due to the flatness of the earth). Author

N72-32410*# National Aeronautics and Space Administration, Washington, D.C.
ON THE RELATIONSHIP BETWEEN MESOSPHERIC CIRCULATION AND THE FREQUENCY OF NOCTILUCENT CLOUDS
W. Schroeder Jul. 1972 8 p refs Transl. into ENGLISH from Gerlands Beitr. Geophys. (Leipzig), v. 77, no. 4, 1968 p 303-308
(NASA-TT-F-14415) Avail: NTIS HC $3.00 CSCL 04A

It is shown by the example of selected observations that a relationship exists between mesospheric circulation (Faust's model) and the frequency of noctilucent clouds. The prerequisite for the formation of noctilucent clouds are low temperatures and other components such as, sufficient H_2O conditions. During the winter circulation (descending motion according to Faust's model), no noctilucent clouds can be observed. Author

N72-32411*# National Aeronautics and Space Administration, Washington, D.C.
FIRST RESULTS ON RAPID REGISTRATION OF ELECTRO-ATMOSPHERIC DISCHARGE
Mario Bossolasco, Ignazio Dagnino, and Giuseppe Flocchini Jul. 1972 10 p Transl. into ENGLISH from Geofis. Meteorol. (Genoa), v. 18, no. 3/4, 1969 p 90-97
(NASA-TT-F-14417) Avail: NTIS HC $3.00 CSCL 04A

The results of rapid measurements by a cathode ray direction finder (CRDF) of electron-atmospheric discharges in meteorological storms are presented. The measured intensity of the discharge which depends on the characteristics and distance of the discharge from the measuring station are presented for discharges over 200km from Genoa. Schematics of the CRDF are included. F.O.S.

N72-32412*# National Aeronautics and Space Administration, Washington, D.C.
ON NOCTILUCENT CLOUDS
Wilfried Schroeder Jul. 1972 13 p refs Transl. into ENGLISH from Wetter Leben (Vienna), v. 22, 1970 p 54-59
(NASA-TT-F-14414) Avail: NTIS HC $3.00 CSCL 04A

Observational data on noctilucent clouds are presented, including geographic distribution, seasonal frequencies, duration, circumstances for movement, and particle measurement. Theoretical concepts are also considered, emphasizing volcanic relationship and intrusions of cosmic dust. J.A.M.

N72-32413*# Kanner (Leo) Associates, Redwood City, Calif.
NEW METHOD FOR THE STUDY OF SOLID PARTICLES IN THE STRATOSPHERE
Rene Challande and Benjamin David Washington NASA Feb. 1972 4 p refs Transl. into ENGLISH from C. R., Acad. Sci. (Paris), v. 250, no. 8, 1960 p 1520-1521 Sponsored by NASA
(NASA-TT-F-14467) Avail: NTIS HC $3.00 CSCL 04A

A method by which microscopic and submicroscopic particles can be collected simultaneously in the same experiment is described. Use is made of the properties of an ionized electric field under the conditions imposed by rarefied air. The apparatus, based on this principle, performed according to design during a balloon ascension to an altitude for about 15,000 meters.
Author

N72-32414*# National Aeronautics and Space Administration, Washington, D.C.
THEORY OF PARAMETRIC PROCESSES IN PLASMA AND DETERMINATION OF ELECTRON CONCENTRATION ON THE POLAR IONOSPHERE
M. A. Savchenko Oct. 1972 22 p refs
(NASA-TT-F-14589; Pr-101) Avail: NTIS HC $3.00 CSCL 03B

Consideration was given to the effect of parametric processes and combined scattering of electromagnetic waves on plasmons in turbulent plasma, excited by a flux of charged particles (efflux of electrons in the polar ionosphere). The frequencies and intensities of satellite waves were found. The possibility of determining electron concentration in the ionosphere is indicated and findings concerning the nature of plasma oscillations were obtained. Kinetic equations were obtained for long wave electron Langmuir oscillations (plasmons).
Author

N72-32415*# Dayton Univ. Research Inst., Ohio.
INTERRELATED STRUCTURE OF HIGH ALTITUDE ATMOSPHERIC PROFILES
Nicholas A. Engler and Mark A. Goldschmidt Sep. 1972 124 p ref
(Contract NAS8-28231)
(NASA-CR-61398) Avail: NTIS HC $8.25 CSCL 04A

A preliminary development of a mathematical model to compute probabilities of thermodynamic profiles is presented. The model assumes an exponential expression for pressure and utilizes the hydrostatic law and equation of state in the determination of density and temperature. It is shown that each thermodynamic variable can be factored into the produce of steady state and perturbation functions. The steady state functions have profiles similar to those of the 1962 standard atmosphere while the perturbation functions oscillate about 1. Limitations of the model and recommendations for future work are presented.
Author

N72-32416*# National Aeronautics and Space Administration, Washington, D.C.
KINETIC THEORY OF THE UPPER ATOMOSPHERE
A. I. Ivanovsky, A. I. Repnev, and E. Shvidlovsky Jun. 1972 34 p Transl. into ENGLISH of the book "Kineticheskaya Teoriya Verkhney Atmosfery" Leningrad, Gidrometeorizdat Press, 1967 p 1-32
(NASA-TT-F-14434) Avail: NTIS HC $3.75 CSCL 04A

From a system of Boltzmann kinetic equations for a gas mixture subjected to photon radiation, generalized hydrodynamic equations were formulated which included diffusion and thermodiffusion phenomena, chemical reactions, and magnetohydrodynamic processes. The generalized hydrodynamic system was used in the analysis of upper atmospheric properties.
Author

N72-32417*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF THE GLOBAL STRUCTURE OF THE STRATOSPHERE AND MESOSPHERE WITH SOUNDING ROCKETS AND WITH REMOTE SENSING TECHNIQUES FROM SATELLITES
Donald F. Heath, Ernest Hilsenrath, Arlin J. Krueger, William Nordberg, C. Prabhakara, and J. S. Theon Aug. 1972 121 p refs Presented at the Intern. School of Atmospheric Phys., Ettore Majorana Center for Sci. Culture, Erice, Italy, 13-27 Jun. 1971
(NASA-TM-X-66044; X-651-72-279) Avail: NTIS HC $8.25 CSCL 04A

Brief descriptions are given of the techniques involved in determining the global structure of the mesosphere and stratosphere based on sounding rocket observations and satellite remotely sensed measurements.
A.L.

N72-32418*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ESTIMATION OF SEA SURFACE TEMPERATURE FROM REMOTE MEASUREMENTS IN THE 11-13 MICRON WINDOW REGION
C. Prabhakara, B. J. Conrath, and V. G. Kunde Oct. 1972 17 p refs
(NASA-TM-X-66053; X-651-72-358) Avail: NTIS HC $3.00 CSCL 08C

The Nimbus-4 IRIS data was examined in the spectral region 775 to 1250/cm (8-13 microns) for useful information to determine the sea surface temperature. The high spectral resolution data of IRIS was degraded to low resolution by averaging to simulate a multi-channel radiometer in the window region. These simulated data show that within the region 775-975/cm (12.9-10.25 microns) the brightness temperatures are linearly related to the absorption parameters. Such a linear relationship is observed over cloudy as well as clear regions and over a wide range of latitudes. From this linear relationship it is feasible to correct for the atmospheric attenuation and get the sea surface temperature, accurate to within 1 K, in a cloud free field of view. The information about the cloud cover is taken from the TV pictures and BUV albedo measurements on board the Nimbus-4 satellite.
Author

N72-32419*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROVISIONAL HOURLY VALUES OF EQUATORIAL Dst FOR JANUARY TO JUNE 1972
M. Sugiura and D. J. Poros (Computer Sci. Corp, Silver Spring, Md.) Sep. 1972 8 p
(NASA-TM-X-66052; X-645-72-355) Avail: NTIS HC $3.00 CSCL 04A

Provisional hourly values of equatorial atmospheric radiation conditions for the period January to June 1972 were obtained. The data are presented in numerical tables with graphical presentation of the digital data included.
Author

N72-32420# Royal Inst. of Tech., Stockholm (Sweden).
POTENTIAL DOUBLE LAYERS IN THE IONOSPHERE
Lars P. Block [1971] 47 p refs
(TRITA-EPP-71-14) Avail: AEC Depository Libraries

Recent observations have indicated the existence of sheaths in the upper ionosphere. Sheath theories in plasmas are reviewed in terms of macroscopic equations for thermal plasmas. The role of Bohm criteria for the existence of sheaths is analyzed. The Langmuir condition is rederived and demonstrated for stationary and moving sheaths. Also treated are sheaths with reduced or vanishing current and particles trapped between sheaths and magnetic mirrors. Finally, consequences of sheaths in space for auroral-particle acceleration and auroral forms are discussed. In particular, it is shown that both stable and transient sheaths may be associated with simultaneous precipitation of ions and electrons.
Author (NSA)

N72-32421# Bettis Atomic Power Lab., Pittsburgh, Pa.
EFFECT OF EROSION AND DEPOSITION ON SAMPLING OF ENTRAINED PARTICLES
S. K. Beal Apr. 1972 59 p refs

(Contract AT(11-1)-GEN-14)
(WAPD-TM-1014) Avail: NTIS

Nonrepresentative samples of suspensions may result from particle deposition and erosion in systems used for obtaining samples of a main stream for concentration, size distribution, and specific activity. A mathematical analysis was performed to determine the magnitude and kinetics of this phenomenon, and it was found that the most representative samples would be obtained in systems with short sampling lines of large diameter, oriented vertically. In addition, the sampling should be carried out at an optimum fluid velocity which minimizes the deposition rate. The analysis provides a way in which this velocity can be predicted theoretically. Author

N72-32422# Batelle Columbus Labs., Ohio.
AMCHITKA BIOENVIRONMENTAL PROGRAM. APPLICATION OF PHOTOGRAMMETRIC TECHNIQUES FOR ENVIRONMENTAL SURVEILLANCE OF AMCHITKA ISLAND, ALASKA Annual Progress Report, 1 Jul. 1969 - 30 Jun. 1970
Joachim G. Stephan and Ian M. Mercier Mar. 1972 49 p refs
(Contract AT(26-1)-171)
(BMI-171-135) Avail: NTIS

Three aerial photogrammetric surveys were made to determine sea otter abundance and distribution at Amchitka Island, Alaska. Kodak Ektachrome Aero Film Type 8443 was found to be particularly useful in these surveys because it renders sea otters black and the sea blue in oblique photography. Results indicate that about 2800 sea otters were in the Amchitka area (out to 5 miles from shore) during the survey period. This estimate was obtained by employing the largest number counted during any survey and increasing this by 15 percent to account for animals that, because of their behavior, were not photographed (diving for food, etc.). Color, infrared color, and panchromatic photography were also used to document the bioenvironmental effects of Milrow, an underground nuclear test conducted on October 2, 1969. Normal color film was found to be superior to other film types for detecting fresh rock falls, soil slides, and turbid waters. Infrared color films yielded the best information about vegetation. Most disturbances were noted on the Pacific coastline. A single large slide (located in Square Bay and involving about 7,000 cu yd of rock movement) was noted on the Bering side. There were few other damage sites on that side. Author (NSA)

N72-32423# Hawaii Inst. of Geophysics, Honolulu.
[PHYSICAL AND CHEMICAL OCEANOGRAPHIC AND ANOMALOUS GRAVITY RESEARCH] Annual Progress Report, 1 Jan. - 31 Dec. 1971
George P. Woollard, Klaus Wyrtki, G. H. Sutton, and Keith Chave 31 Dec. 1971 157 p refs
(Contract N00014-70-A-0016-0001; NR Proj. 083-603)
(AD-742342; HIG-71-19) Avail: NTIS CSCL 08/10

The report is subdivided on the basis of the three tasks covered by subject contract with a separate report for each task prepared by the respective principal investigators. The report for Task 2 also includes the cruise reports for Legs 1, 2, 3, 4, 5 and 6 of the 1971 cruise of R/V KANA KEOKI which left Honolulu April 26, 1971 and is not expected back until approximately June 1, 1972. The operational areas covered are from Ponape in the Marshall Islands to Palau, the Carolina Basin-Bismarck Sea area, across the Ontong Java Plateau to Fiji, the Fiji Plateau with a crossing of the Austral Island Ridge to Tahiti.
Author (GRA)

N72-32424# Dikewood Corp., Albuquerque, N.Mex.
POLAR CAP BIBLIOGRAPHY WITH ABSTRACTS. 1: THE POLAR CAP IONOSPHERE
June G. Brenton, comp. 15 Mar. 1972 198 p refs
(Contract F19628-70-C-0212; AF Proj. 7661)
(AD-743952; DC-TR-1212-2; AFCRL-72-0241; SR-2-Vol-1) Avail: NTIS CSCL 04/1

The Polar Cap Ionosphere was compiled as Volume 1 in a series of bibliographies with abstracts on selected topics in the literature on upper atmospheric phenomena in the inner regions of the polar caps. Although a few references are to papers stemming from investigations during the First Polar Year, in general, the references begin with those on activities during the International Geophysical Year and continue with articles published through the year 1971. Author (GRA)

N72-32425# Coast Guard, Washington, D.C.
ICEBERG CLASSIFICATION USING SIDE LOOKING AIRBORNE RADAR
L. D. Farmer May 1972 44 p
(CG Proj. 726414)
(AD-742653) Avail: NTIS CSCL 08/12

The Coast Guard has been experimenting with a Side Looking Airborne Radar for use in radar target classification by the International Ice Patrol. The report, which was prepared for the International Ice Patrol, outlines the classification clues and techniques that appear valid at this time for classifying targets as either ice or other than ice. In addition, the report contains information on mensuration, mission planning and radar malfunctions to enhance its value as a training aid.
Author (GRA)

N72-32426# Coast Guard, Washington, D.C. Office of Research and Development.
CALIBRATION AND MAINTENANCE EXPERIENCE WITH AN OCEANOGRAPHIC AND METEOROLOGICAL DATA ACQUISITION SYSTEM FOR LARGE NAVIGATION BUOYS Final Report
J. A. McIntosh May 1972 56 p refs
(AD-742659) Avail: NTIS CSCL 08/10

Instruments to measure air temperature and pressure, wind speed and direction, water temperature and conductivity, and current speed and direction were installed on a large, un-manned buoy, together with equipment to telemeter the data ashore. On shore, a terminal was installed to receive, store and display the data. The purpose of the installation was to gain experience with instrumentation of this type. To date the installation is about four years old. The report discusses the design, installation and maintenance experience obtained from the instrumentation.
Author (GRA)

N72-32427# Army Foreign Science and Technology Center, Charlottesville, Va.
REDUCTION OF GRAVIMETRIC MEASUREMENTS ON THE BASIS OF NUMERICAL SOLUTION OF MOLODENSKII'S INTEGRAL EQUATION
O. K. Litvinenko and Yu. G. Rusyanov Apr. 1972 30 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Fiz. Zemli (Moscow), no. 9, Sep. 1971 p 49-62
(AD-741861; ACIC-TC-1819) Avail: NTIS CSCL 08/5

A numerical method of reduction of gravimetric measurements, based on Molodenskiy's integral equation, is considered. The method is put into practice on computers with input functions assigned on an arbitrary network of points. An algorithm of calculations is discussed, and an investigation of accuracy of the method is performed. Author (GRA)

N72-32428# Army Foreign Science and Technology Center, Charlottesville, Va.
METHODICAL INSTRUCTIONS FOR THE COURSE PRINCIPLES OF SPACE GEODESY
A. P. Polezhaev Mar. 1972 99 p refs Transl. into ENGLISH of the book "Metod. Ukazaniya po Kursu Osnovy Kosmich. Geod." Moscow, Mosk. Inst. Inzhenerov Geod., Aerofotosemki i Kartografii, 1970 79 p
(AD-741860; ACIC-TC-1818) Avail: NTIS CSCL 08/5

The subjects discussed in the report include the following: basic problems of space geodesy; systems of coordinates and the measurement of time; elements of celestial mechanics; basic principles of using satellites for the solution of geometric

problems of space geodesy; basic concepts of using satellites for the solution of dynamic problems of space geodesy; artificial earth satellites used for geodetic purposes; main methods and technical means for observation of satellites used in space geodesy; and processing of satellite observation results.
Author (GRA)

N72-32429# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
TERRAIN AND COASTAL CONDITIONS ON THE ARCTIC ALASKAN COASTAL PLAIN. ARCTIC ENVIRONMENTAL DATA PACKAGE, SUPPLEMENT 1
Paul W. Sellmann, Kevin L. Carey, Charles M. Keeler, and Allan D. Hartwell Mar. 1972 83 p refs
(ARPA order 1615)
(AD-741354; CRREL-SR-165-Suppl) Avail: NTIS CSCL 08/6

The group of four reports describes the characteristics and seasonal variation of prominent relief features on and along the margin of the arctic coastal plain. These relief features include polygonal ground patterns, lake scarps and coastal features. The range of polygonal ground patterns commonly found is illustrated by a number of transects. The influence of the seasonal snow cover on relief is indicated by profiles taken during the summer and the winter. The winter profiles were taken during the period of maximum snow accumulation. The subduing influence of the seasonal snowpack is much more apparent in areas of high relief. Irregularities in the snow surface may approach those found in the more featureless areas of summer relief. A discussion of properties of the snow cover is also included from observations in the Barrow study area. Author (GRA)

N72-32430# Woods Hole Oceanographic Institution, Mass.
NOTES ON THE 1971 SUMMER STUDY PROGRAM IN GEOPHYSICAL FLUID DYNAMICS AT THE WOODS HOLE OCEANOGRAPHIC INSTITUTION. VOLUME 1: COURSE, LECTURES AND ABSTRACTS OF SEMINARS
Nov. 1971 135 p refs
(Grant NSF GZ-1494)
(PB-208567; WHOI-Ref-71-63-Vol-1) Avail: NTIS CSCL 04B

Course lectures and abstracts of seminars on planetary atmospheric dynamics are presented. GRA

N72-32431# Woods Hole Oceanographic Institution, Mass.
NOTES ON THE 1971 SUMMER STUDY PROGRAM IN GEOPHYSICAL FLUID DYNAMICS AT THE WOODS HOLE OCEANOGRAPHIC INSTITUTION. VOLUME 2: FELLOWSHIP LECTURES
Nov. 1971 149 p refs
(Grant NSF GZ-1494)
(PB-208568; WHOI-Ref-71-63-Vol-2) Avail: NTIS CSCL 04B

The manuscripts of research lectures given at a seminar concerning planetary atmospheric dynamics are presented. GRA

N72-32432# Colorado School of Mines, Golden.
WORKSHOP: DETERMINATION OF THE MINIMUM CONDUCTIVITY OF THE EARTH'S CRUST Final Summary Report
George V. Keller 23 Jun. 1972 22 p
(Contract N00014-71-A-0430-0002; APRA Order 2100)
(AD-743867) Avail: NTIS CSCL 08/7

The report describes the results of a small working group which met in the Green Center on the campus of the Colorado School of Mines to discuss the problem of measuring the minimum electrical conductivity in the earth's crust, with special reference to the possibility of long-range communications through such a low-conductivity region. Author (GRA)

N72-32433# Naval Postgraduate School, Monterey, Calif.
GENERAL CIRCULATION EXPERIMENTS WITH A TWO LEVEL QUASI-GEOSTROPHIC MODEL INCLUDING NONLINEAR INTERACTION BETWEEN TWO WAVES AND THE MEAN FLOW M.S. Thesis
Glenn Curtis Trumbower Mar. 1972 68 p refs
(AD-743766) Avail: NTIS CSCL 04/1

Long term numerical integrations were performed with a two-level model utilizing the quasi-geostrophic equation set. Friction was incorporated through the vertical derivative of the eddy stress and heating was applied as a linear function of latitude. The long-term interactions between one or two waves in the zonal direction and the mean flow were examined. The stability of the initial mean flow was investigated with linearized equations and the most unstable wave numbers were determined. The nonlinear equations were integrated using the most unstable wave in the initial conditions. 300 day forecasts were made with various values of the heating, beta, wall separation, and wave number. A second wave number was introduced into the experiments in order to determine the most likely wave number for the fully evolved mean flow. Author (GRA)

N72-32434# New Hampshire Univ., Durham. Antenna Systems Lab.
OBSERVATIONS OF LARGE SCALE IONOSPHERIC IRREGULARITIES USING A LONG BASELINE INTERFEROMETER Final Report, 1 Feb. 1971 - 31 Jan. 1972
Albert D. Frost and Ronald R. Clark 29 Feb. 1972 8 p ref
(Contract F19628-71-C-0114; AF Proj. 4643)
(AD-743950; ASL-72-A; AFCRL-72-0251) Avail: NTIS CSCL 04/1

A 35 mile long baseline radio interferometer at 136 MHz was implemented and placed in operation August 1971 for the detection and observation of large scale ionospheric irregularities. A multistation microwave relay link was established between the Foss Farm field site of the Antenna Systems Laboratory, University of New Hampshire, Durham, and the Sagamore Hill site of the Air Force Cambridge Research Laboratories. The system was operated and data obtained from 15 August 1971 to 15 March 1972. Author (GRA)

N72-32435# Trinity Coll., Dublin (Ireland).
AUTOMATION IN GROUND SURVEYS, WITH PARTICULAR REFERENCE TO THE DETERMINATION OF ELEVATION Final Report
R. C. Cox 31 May 1972 29 p refs
(Grant DA-ERO-591-71-G0008)
(AD-743995) Avail: NTIS CSCL 08/2

The author has attempted to evaluate the present state of the art in ground surveys with particular reference to the developments in instrumentation leading toward the automation of measuring processes. The report also deals with desirable systems which may be developed during the next two decades. The inability of elevation measuring instruments to break away from their dependence on physical parameters such as gravity, temperature and pressure, and the restraining influence of atmospheric refraction on the accuracy of survey measurements in general are also dealt with and suggestions for further research are discussed. Author (GRA)

N72-32436# Scripps Institution of Oceanography, La Jolla, Calif.
EMPIRICAL TECHNIQUES APPLIED TO LARGE SCALE AND LONG PERIOD AIR-SEA INTERACTIONS, A PRELIMINARY EXPERIMENT
Jerome Namias and Robert M. Born 1 Feb. 1972 40 p refs
(Contract N00014-69-A-0200-6006)
(AD-743864; SIO-Ref-72-1) Avail: NTIS CSCL 08/3

The authors use a statistical approach in developing an air-sea dynamic model. Atmospheric circulation is correlated from sea surface temperatures and sea level pressure fields.
GRA

N72-32437# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
STRATOSPHERIC-IONOSPHERIC INTERACTION DURING

THE MOVEMENT OF A PLANETARY WAVE IN JANUARY 1967

Ben H. Williams, Robert O. Olsen, and Marvin D. Kays Fort Monmouth, N. J. Mar. 1972 44 p refs
(DA Proj. 1T0-61102-B-53-A)
(AD-744470; ECOM-5428) Avail: NTIS CSCL 04/1

Examination of meteorological synoptic analyses in the stratosphere and lower mesosphere and f (min) values observed over North America reveals a significant correlation between the passage of a deep planetary wave and increased electron densities in the lower ionosphere. As evidence of this correlation, a series of synoptic analyses concentrated in the upper stratosphere, along with longitudinal cross sections of zonal winds and temperatures, and profiles of f (min) and the zonal, meridional and vertical components of the wind at 40 and 50 km. These calculations show, in general, that the correlation increases with altitude, decreases with an increase in latitude and that the zonal wind in midlatitudes exhibits the highest correlation. Correlation coefficients between f (min) and planetary magnetic indices, solar sunspot number and solar flux would point to exclusion of extraterrestrial parameters as a source of the observed electron increase. Author (GRA)

N72-32438# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.

A FORTRAN PROGRAM THAT DERIVES AIR TEMPERATURE, DENSITY, AND COMPOSITION AS A FUNCTION OF HEIGHT AND EXOSPHERIC TEMPERATURE

John Christopher Kotelly 6 Mar. 1972 42 p
(AF Proj. 0001)
(AD-744077; AFCRL-72-0171; AFCRL-ERP-390) Avail: NTIS CSCL 04/1

Dr. L. C. Jacchia (1971) has developed a static diffusion model of the atmosphere that matches parameters at 150 km and the observed densities from satellite drag at greater heights. His report presents tables showing temperature, density and composition as a function of height and exospheric temperature. The Jacchia model has been used in working programs by reading the tables and converting from log densities to simple densities and vice-versa, to interpolate the tables and make the necessary corrections. This report presents a FORTRAN subroutine which gives the precise density information (along with the appropriate corrections) directly by using the analytic equations. Author (GRA)

N72-32439# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.

OPTICAL EFFECTS OF THE MARCH 1970 GEOPHYSICAL EVENT AT THE AFCRL GEOPOLE OBSERVATORY, THULE AIR BASE, GREENLAND

S. M. Silverman and J. G. Moore 18 Apr. 1972 21 p refs
(AF Proj. 7661)
(AD-744074; AFCRL-72-0259; AFCRL-ERP-398) Avail: NTIS CSCL 04/1

The optical observations from Geopole Observatory, Thule A. B., Greenland, during the 6 to 10 March 1970 event are discussed. The spectral data were considered in detail for two periods, on March 6 and March 9, preceding and during the PCA. The ratio of the 5577 A (OI) and 6300 A (OI) emission intensities for several disturbed periods is found to be consistent with excitation somewhat below the normal F-region heights for production of 6300 A (OI). Use of optical and riometer data in conjunction indicates a hardening of the input energy spectrum on the 8th with a strong softening on the 9th, in accord with expectations from the moderate character of the PCA. A comparison of luminosity fluctuations at Qanaq and Geopole lead to movements of excitations with velocities of the order of 250 to 300 m/s. Possible flare effects are noted and discussed. Author

N72-32440# Dikewood Corp., Albuquerque, N.Mex.

POLAR CAP BIBLIOGRAPHY

June G. Brenton 8 Sep. 1971 96 p refs
(Contract F19628-70-C-0212; AF Proj. 7661)
(AD-744090; DC-TR-1212-1; SR-1; AFCRL-72-0239) Avail: NTIS CSCL 04/1

The Polar Cap Bibliography was compiled with the objective of providing information on the nature and extent of past and current polar cap research in the field of upper atmosphere phenomenology. The bibliography lists references to the literature on upper atmospheric phenomena in the polar caps grouped by subject with introductory summaries. The introductory summaries generally cover briefly the contents of the literature referenced for each subject. Sixty-eight subjects are covered with a total of 2,211 references in 385 pages, of which 134 pages contain the text of the introductory summaries. The eight major sections bear subject headings as follows: (1) Surveys and Summaries; (2) Atmospheric Structure; (3) Energy Inputs; (4) Energy Outputs; (5) Disturbance Phenomena; (6) Ionosphere; (7) Geophysical Effects Peculiar to Polar Cap Regions; and (8) Instrumentation and Measurement Systems. Author (GRA)

N72-32441# Spectran, Inc., Hollywood, Calif.

DIAL PACK DUST CLOUD DATA ANALYSIS Final Report

J. C. Auckland Griffiss AFB, N. Y. RADC Mar. 1972 48 p refs
(Contract F30602-71-C-0297)
(AD-744084; RADC-TR-72-68) Avail: NTIS CSCL 04/1

Properties of the atmosphere can be measured directly or indirectly. Direct measurements provide point measurement accuracies but indirect or remote sensing techniques permit probes of a large volume at times when direct measurements may not be possible. Event Dial Pack in July of 1970 is an example of such a condition. The report discusses measurements made by 10.2 and 30 GHz microwave radiometers upon the dust clouds during that experiment and the results of a detailed analysis upon that data. Author (GRA)

N72-32442# Deputy Assistant Secretary of Defense (Environmental Quality), Washington, D.C.

DEPARTMENT OF DEFENSE ENVIRONMENTAL QUALITY PROGRAM Status Report

1 Jan. 1972 120 p
(AD-742107) Avail: NTIS CSCL 13/2

The report provides the status of the Department of Defense Environmental Quality Program as of 1 January 1972. It discusses the overall Defense Department policy and programs for the protection and enhancement of the nation's environment and indicates the various organizational elements involved and their respective responsibilities. The specific programs of the Defense Supply Agency, Army (Military Activities), Army (Civil Works), Navy and Air Force are reviewed in separate chapters. These programs include those to abate air, water, noise, land and radiation pollution; solid waste, toxic and hazardous materials disposal; research and development activities, training programs, and the enhancement of the environment. Author (GRA)

N72-32443# Lamont-Doherty Geological Observatory, Palisades, N.Y.

LONG-PERIOD SEISMOLOGICAL RESEARCH PROGRAM Annual Report, 15 Mar. 1971 - 14 Mar. 1972

Lynn R. Sykes and John M. Savino 4 Apr. 1972 34 p refs
(Contract F44620-71-C-0082; ARPA Order 1774)
(AD-744130; AFOSR-72-1215TR) Avail: NTIS CSCL 17/10

During the first year of the subject contract, the purpose of the research program was twofold: (1) To maintain the previously installed high-gain seismograph stations at the following five stations: Charters Towers, Australia (CTA); Fairbanks, Alaska (FBK); Eilat, Israel (EIL); Chiang Mai, Thailand (CHG); and Ogdensburg, New Jersey (OGD), and to install and maintain a sixth high-gain station at Toledo, Spain (TLO). (2) To conduct research on the long-period analog and digital data from the above six stations and from the two additional stations installed at Albuquerque, New Mexico (ALQ) and Kongsberg, Norway (KON), by personnel from the National Oceanic and Atmospheric Administration (NOAA). The most significant finding of the

analysis of data pertinent to the earthquake-explosion discrimination problem is one based on results from the seismic detection, discrimination, earth noise, and digital filtering studies.
Author (GRA)

N72-32444# National Technical Univ., Athens (Greece). Photogrammetric Lab.
LONG TERM SCIENTIFIC FORECAST FOR GEODESY AND PHOTOGRAMMETRY Technical Report, Jun. 1971 - Jun. 1972
John Badekas Jun. 1972 8 p refs
(Grant DA-ERO-591-71-G0006)
(AD-744347) Avail: NTIS CSCL 08/2

The report summarizes the thoughts made during one year period, from June 1971 to June 1972, on long term scientific forecasting for the period of Geodesy and Photogrammetry. The most promising trends in Photogrammetry and Geodesy are discussed.
Author (GRA)

N72-32445# Liege Univ. (Belgium). Dept. of Astrophysics.
CELESTIAL SPECTRA AND ATMOSPHERIC EFFECTS ON RADIATION MAINLY IN THE INFRARED Final Scientific Report, 16 Jul. 1969 - 15 Dec. 1971
Marcel V. Migeotte 15 Mar. 1972 96 p refs
(Contract F61052-69-C-0014; AF Proj. 7670)
(AD-744087; AFCRL-72-0299) Avail: NTIS CSCL 03/2

Contents: The spectrum of the sum and of the earth's atmosphere observed at the Jungfraujoch; The spectrum of the sun observed from a high altitude balloon (1.2 to 3 micrometers and region of 345 micrometers); Observations of cold stars, at the Jungfraujoch; The spectrum of the sun, observed from a high altitude balloon (1.2 to 3.0 microns).
GRA

N72-32446# Rice Univ., Houston, Tex.
IONOSPHERIC HEATING ANALYSIS. HF PLASMA LINE ENHANCEMENTS AT ARECIBO Final Technical Report, 1 Oct. 1970 - 1 Dec. 1971
William E. Gordon, Hebert C. Carlson, and Robert L. Showen Griffiss AFB, N. Y. RADC Feb. 1972 17 p refs Prepared in cooperation with Arecibo Ionospheric Obs.
(Contract F30602-71-C-0155; ARPA Order 1423)
(AD-744523; RADC-TR-72-120) Avail: NTIS CSCL 04/1

The non-linear enhancement of the plasma line was observed in January 1971 by Carlson, Gordon and Showen (JGR 1972). The enhancement spectrum includes: a strong narrow line displaced below the HF (5.62 MHz) by the frequency of the ion acoustic waves (f sub i) in the plasma (about 4 kHz); a broader line (about 30 kc width) and other weak lines near the HF; a line near (f sub i). Enhancements above thermal levels range above a factor of 10,000 and may be taken as verification of the HF excitation of parametric instabilities in the ionosphere. Significant time variations over scales of tens of microseconds through hours were seen. Upshifted and downshifted power dependence, and decay rates (of the order of msec). The O-mode (but not the X-mode) excitation of these enhancements is of significance to heating experiments.
Author (GRA)

N72-32447# Royal Norwegian Council for Scientific and Industrial Research, Kjeller.
NORSAR RESEARCH AND DEVELOPMENT Report for 1 Jul. 1970 - 30 Jun. 1971
Eyestein S. Husebye Apr. 1972 47 p refs
(Contract F19628-70-C-0283)
(AD-740845; NORSAR-23; ESD-TR-72-143) Avail: NTIS CSCL 17/10

The report covers the period 1 July 1970 - 30 June 1971 which is characterized by system developments and software debugging efforts, establishing of organizational procedures required for the routine NORSAR operation and research aimed at system improvements and array performance evaluation. The most important single event in the reporting period was that the NORSAR array became operational in March 1971.
Author (GRA)

14 INSTRUMENTATION AND PHOTOGRAPHY

Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders; transducers; aerial photography; and telescopes and cameras.

N72-32448 Department of Energy, Mines and Resources, Ottawa (Ontario).
RESOURCE SATELLITES AND REMOTE AIRBORNE SENSING FOR CANADA. REPORT NO. 4: CARTOGRAPHY AND PHOTOGRAMMETRY
Dennis White, ed. 1971 17 p
(M75-2/4; Rept-4) Copyright. Avail: Issuing activity

The possible benefits to cartography and photogrammetry of Canada from remotely sensed data are discussed, concentrating on four considerations. (1) The potential impact of the proposed United States Earth Resources Technology Satellites on Canadian cartography and photogrammetry is discussed. The applications of imagery and data that might become available as a result of the proposed Skylab project are also considered. (2) The basic capability required of true cartographic satellite systems suitable for Canadian cartographic and photogrammetric applications is indicated. (3) General remote sensing requirements in photogrammetry and cartography are delineated. (4) The organizational structure required to carry out a Canadian earth resources satellite and remote-sensing program is reviewed.
Author

N72-32449 National Lending Library for Science and Technology, Boston Spa (England).
A TELESCOPE WITH A 6-METRE MIRROR
B. K. Ionnisiani Jul. 1972 26 p refs Transl. into ENGLISH from Izv. Spetsial'noi Astrofiz. Observ. (USSR), v. 3, 1971 p 3-18
(NLL-RTS-7353) Avail: Natl. Lending Library, Boston Spa, Engl.: £2.60; 9 NLL photocopy coupons

The basic data are presented which form the design theory for a large optical telescope with a 6-meter mirror. The choice of an altazimuth mounting for the telescope is justified. The telescope design, its optical system, and the modes of operation of its control system are briefly outlined. Some details are given of the telescope's construction.
Author

N72-32450 National Lending Library for Science and Technology, Boston Spa (England).
THE MODEL OF THE BIG TELESCOPE ON AN ALTAZIMUTH MOUNTING
Ya. B. Vyatskin Jul. 1972 9 p refs Transl. into ENGLISH from Izv. Spetsial'noi Astrofiz. Observ. (USSR), v. 3, 1971 p 20-25
(NLL-RTS-7354) Avail: Natl. Lending Library, Boston Spa, Engl.: £0.90; 3 NLL photocopy coupons

A scale model of the big telescope on an altazimuth mounting, and the arrangement of its control system is described. The experimental data from the study of the BTA model program control are presented.
Author

N72-32451 National Lending Library for Science and Technology, Boston Spa (England).
THE INFLUENCE OF BACKGROUND COMPENSATION IN X-RAY RADIOMETRIC LOGGING
V. A. Meier et al Jul. 1972 8 p refs Transl. into ENGLISH from Uch. Zap. Leningr. Gos. Univ., Ser. Fiz. i Geolog. Nauk (Leningrad), v. 19, no. 346, 1969 p 61-69
(NLL-RTS-6739) Avail: Natl. Lending Library, Boston Spa, Engl.: £0.80

The effectiveness of using background compensation in X-ray radiometric logging was tested under working conditions

with tin. Results show use of such compensation provides the possibility of linear diagram averaging in the spectral proportions and improves the accuracy of qualitative determinations in the RRK probe. E.H.W.

N72-32452* Boeing Co., Huntsville, Ala.
BORESCOPE WITH VARIABLE ANGLE SCOPE Patent
Drury K. Mitchell, inventor (to NASA) Issued 26 Sep. 1972 10 p Filed 22 Dec. 1970 Supersedes N72-13362 (10 - 04, p 0480
(NASA-Case-MFS-15162; US-Patent-3,694,094; US-Patent-Appl-SN-100639; US-Patent-Class-356-241; US-Patent-Class-350-79) Avail: US Patent Office CSCL 14B

A borescope with an adjustable hinged telescoping optical system which will permit visual inspection of bore surfaces at angles greater than 90 degrees is described. This borescope is particularly designed for the inspection of the interior or bore of a pipeline which may have a bend, however, it can be effectively used on straight pipelines. The device consists of a straight tubular barrel with operator viewing eyepiece on one end and a telescoping head assembly on the other. Between the tubular barrel and head assembly may be inserted an adjustable hinged portion so as to position the head assembly through a sharp bend in the pipe. For use about even sharper bends in the pipe, a fixed angle portion may be inserted between the telescoping head assembly and adjustable hinge portion. The telescoping head carries a mirror and illumination means so that an operator looking through the eyepiece can view the illuminated interior side walls of the bore. Official Gazette of the U.S. Patent Office

N72-32453*# Kansas Univ., Lawrence. Space Technology Labs.
USE OF FEATURE EXTRACTION TECHNIQUES FOR THE TEXTURE AND CONTEXT INFORMATION IN ERTS IMAGERY Bimonthly Progress Report
R. M. Haralick, Principal Investigator and K. Shanmugam 30 Sep. 1972 2 p Sponsored by NASA
(E72-10124; NASA-CR-128178) Avail: NTIS HC $3.00 CSCL 14B

There are no author-identified significant results in this report.

N72-32454*# Arkansas Univ., Little Rock. Dept. of Electronics and Instrumentation.
A GENERAL PURPOSE WIDEBAND OPTICAL SPATIAL FREQUENCY SPECTRUM ANALYZER
G. S. Ballard and F. A. Mellor 11 Aug. 1972 21 p ref
(Grant NGL-04-001-007)
(NASA-CR-128175) Avail: NTIS HC $3.25 CSCL 14B

The light scattered at various angles by a transparent media is studied. An example of these applications is the optical Fourier spectrum measurement resulting from various spatial frequencies which were recorded on a photographic emulsion. A method for obtaining these measurements consists of illuminating the test object with parallel monochromatic light. A stationary lens, placed in the resulting wavefield at a distance of one focal length from the object, will focus parallel waves emanating from the test object at a point lying in the focal plane of the lens. A light detector with a small filtering aperture is then used to measure the intensity variation of the light in the focal or transform plane of the lens. Such measurements require the use of a lens which is highly corrected for all of the common aberrations except chromatic aberration. Author

N72-32455*# California Univ., Berkeley. Space Sciences Lab.
PLANETARY X RAY EXPERIMENT Instrument Report
K. A. Anderson 28 Jul. 1972 75 p refs
(Grant NGR-05-003-458)
(NASA-CR-128250; SSL-Ser-13-Issue-8) Avail: NTIS HC $5.75 CSCL 03B

Design studies for an X-ray experiment using solid state detectors and for an experiment using a proportional counter for investigating Jovian and Saturnian magnetospheres are reported. Background counting rates through the forward aperture and leakage fluxes are discussed for each design. It is concluded that the best choice of instrument appears to have following the characteristics: (1) two separate multiwire proportional counters for redundancy; (2) passive collimation to restrict the field to about 5 deg, wiregrid modulation collimation to about 0.1 deg angular resolution; (3) no active shielding system around the counter body; and (4) light passive shielding around any portion of the counter body exposed to space to absorb most of the cosmic X-ray background. N.E.N.

N72-32456# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ACCELERATION, VELOCITY AND DISPLACEMENT MEASUREMENTS IN THE SURFACE OF RECIPROCATING COMPRESSOR, WITH OCTAVE BAND ANALYSIS, PERCENT BANDWIDTH ANALYSIS AND NUMERICAL VALUES MEASURED
L. X. Nepomuceno 10 May 1972 16 p In PORTUGUESE; ENGLISH summary
(TR-7205.582) Avail: NTIS HC $3.00

The results are reported of the measurements and phase analysis of vibrations in two reciprocating compressors. The specifications, and calibration of the sound level meter are presented. The results are tabulated for each compressor, and graphs summarizing the results are included. Transl. by F.O.S.

N72-32457# Advisory Group for Aerospace Research and Development, Paris (France).
FLIGHT RECORDING IN NATO COUNTRIES, SECOND EDITION
Hollis G. Zerkle, ed. Jul. 1972 75 p refs
(AGARD-AR-39) Avail: NTIS HC $5.75

The characteristics and applications of flight recording instruments in NATO countries is discussed. The instruments and systems are presented according to manufacturer and the standard format contains the following data: (1) general information, (2) scope, (3) basic principles, (4) main characteristics, (5) history, (6) operational experience, and (7) installation. Flight recording projects leading to the development of new instruments are discussed, using similar format. A bibliography of pertinent reports and documents on various aspects of flight recorder application and performance is provided. Author

N72-32458*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODULARIZED INSTRUMENT SYSTEM FOR TURBOJET ENGINE TEST FACILITIES
William C. Nieberding and D. R. Englund, Jr. 1972 26 p ref Presented at Symp. on Instrumentation for Airbreathing Propulsion, Monterey, Calif., 19-21 Sep. 1972; sponsored in part by AFAPL, Naval Air Systems Command, Army Aviation R and D Labs., ONR, and AFOSR
(NASA-TM-X-68123; E-7089) Avail: NTIS HC $3.50 CSCL 14B

A modular instrument system is being developed to handle the many data channels encountered in turbojet engine testing. Each module contains a group of transducers and all the signal conditioning multiplexing, and digitizing electronics necessary for direct interface with a digital computer. The digital interface within each module is the same for all modules; in addition, each module provides a controlled environment for its contents. A minicomputer in the control room gathers the data, performs on-line calculation and display, and interfaces with a shared recording and computing system. The advantages of this system are: (1) reduced manpower for system installation, setup, and checkout; (2) standardized equipment interfaces; (3) increased reliability through automatic system testing and minimization of manual adjustments; and (4) reduced cost through minimization of wiring and simplification of control room display. Author

N72-32459*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PYROMETER FOR MEASUREMENT OF SURFACE TEMPERATURE DISTRIBUTION ON A ROTATING TURBINE BLADE
Donald R. Buchele and Daniel J. Lesco 1972 21 p refs Presented at Symp. on Instrumentation for Airbreathing Propulsion, Monterey, Calif., 19-21 Sep. 1972
(NASA-TM-X-68113) Avail: NTIS HC $3.25 CSCL 14B

A conceptual optical method and some test results are presented for measuring the surface temperature distribution on one of the rotating turbine blades with a surface resolution of 0.05 cm spot diameter at a tip speed of 400 m/sec. The blade is scanned line-by-line by a fixed optical system. During each line-scan, the detector analog output signal is converted to two hundred consecutive digital values that are temporarily stored in a high speed buffer memory, and then transferred at a slower rate to a computer for processing. The signal-to-noise ratio of the silicon avalanche detector is large enough to obtain an accuracy of one percent at 1050 K blade temperature. By averaging 25 scans of the same line the same accuracy can be obtained at 900 K. Author

N72-32460*# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
CONTINUOUS LIQUID LEVEL MEASUREMENTS WITH TIME DOMAIN REFLECTOMETRY
J. E. Cruz, E. H. Rogers, and A. E. Hiester 1972 15 p refs Presented at Cryogenic Eng. Conf., Boulder, Colo., 9-11 Aug. 1972 Sponsored by NASA
(NASA-CR-128198; J-3) Avail: NTIS HC $3.00 CSCL 14B

A time domain reflectometer is considered as a closed loop, one-dimensional radar system. Applying the principle of time domain reflectometry to the detection of cryogenic liquid levels, measurements on the order of + or - 0.3% of total liquid level probe length are possible. The time domain reflectometer liquid level measurement is independent of liquid density variations and is simple to calibrate and operate. Construction of the liquid level sensing probe is described. Author

N72-32461# Royal Aircraft Establishment, Farnborough (England).
SOME TESTS ON THE INTERMITTENCY EFFECT
A. Hnatek Aug. 1972 37 p refs Transl. into ENGLISH from Photogr. Korresp. (Vienna), v. 86, 1951
(RAE-Lib-Trans-1595) Avail: NTIS HC $4.00

The photographic intermittency effect (IE) where a series of intermittent exposures on a photographic material do not produce the same amount of blackening as an equivalent continuous exposure is discussed. Normally the IE decreases, when intensity and the frequency of the intermittent exposures increase, and vice versa. There is thus a point with exposures in the region of .01 to .001 seconds where both intermittent and continuous exposures give virtually the same blackening. It is concluded that the relationship is not consistent since certain tests contradict the bulk of the results. If the intensity is increased beyond a certain level the IE increases, and conversely with a decrease in intensity giving intermittent exposures of 60 seconds or more the IE is found to decrease. Author

N72-32462*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE APPLICATION OF COLOR DISPLAY TECHNIQUES FOR THE ANALYSIS OF NIMBUS INFRARED RADIATION DATA
Lewis J. Allison, G. Thomas Cherrix, and Harold Ausfresser (Westinghouse Defense and Space Center) Washington Aug. 1972 17 p refs Original contains color illustration
(NASA-TN-D-6786; G-1062) Avail: NTIS HC $3.00 CSCL 14B

A color enhancement system designed for the Applications Technology Satellite (ATS) spin scan experiment has been adapted for the analysis of Nimbus infrared radiation measurements. For a given scene recorded on magnetic tape by the Nimbus scanning radiometers, a virtually unlimited number of color images can be produced at the ATS Operations Control Center from a color selector paper tape input. Linear image interpolation has produced radiation analyses in which each brightness-color interval has a smooth boundary without any mosaic effects. An annotated latitude-longitude gridding program makes it possible to precisely locate geophysical parameters, which permits accurate interpretation of pertinent meteorological, geological, hydrological, and oceanographic features. Author

N72-32463*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ENERGY CALIBRATION OF A COSMIC RAY IONIZATION SPECTROMETER
Haven Whiteside (Federal City Coll.), Caron Jo Crannell (Federal City Coll.), Hall Crannell (Catholic Univ.), Jonathan F. Ormes, Michael J. Ryan, and W. Vernon Jones (Louisiana State Univ., Baton Rouge) Sep. 1972 56 p refs Submitted for publication (Grants NGR-09-005-007; NGR-09-050-001)
(NASA-TM-X-66037; X-661-72-316) Avail: NTIS HC $5.00 CSCL 14B

The NASA/GSFC high energy cosmic ray experiment was calibrated during the summer of 1970 using protons and pions with energies from 9.3 GeV to 17.6 GeV. The best measure found for the energy E of an incoming primary particle is sigma I, the total number of ionizing particles observed in the instrument, summed over the various iron modules. The resolution in the calibration energy range is about + or - 30 percent (s.d.) over a wide range of incident angles and positions. The calibration function may be parameterized as e = sigma I/K, where K is predominantly a function of the location of the first interaction and the trajectory of the incoming particle. Author

N72-32464*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
[REPLY TO A PAPER ON THE USE OF TWO MAGNETOMETERS FOR MAGNETIC FIELD MEASUREMENTS ON A SPACECRAFT]
N. F. Ness, K. W. Behannon, R. P. Lepping, F. M. Neubauer, and K. H. Schatten Sep. 1972 13 p refs Submitted for publication
(NASA-TM-X-66041; X-690-72-353) Avail: NTIS HC $3.00 CSCL 14B

The use of two magnetometers for measuring the ambient magnetic field of spacecraft is compared with the single magnetometer variance method. It is shown that the dual magnetometer concept was developed for missions which are conducted with attitude stabilized spacecraft which have been constructed without an adequate magnetics control program. Specific methods for applying the dual magnetometer technique are described and an error analysis is conducted to determine the accuracy of the results. Author

N72-32465# Lockheed Missiles and Space Co., Palo Alto, Calif.
ELIMINATION OF READING AMBIGUITY IN DIGITAL MEASURING DEVICES
A. A. Bogoroditskii, V. G. Ermakov, A. G. Ryzhevskii, and A. A. Skoliarkov [1972] 3 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Priborostr. (USSR), v. 15, no. 6, 1972 p 16-18
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

The possibility is discussed of reading ambiguities in digital measuring devices of the frequency-time group in which measured quantity is converted into code by the method of successive counting with subsequent interpolation of the measurement result. The electronic vernier method is considered as an example. A circuit is described which permits elimination of reading ambiguities. Author

N72-32466# Lockheed Missiles and Space Co., Palo Alto, Calif.
SOME RESULTS OF SPECTROPHOTOMETRY OF NATURAL FORMATIONS FROM THE MANNED SOYUZ-9
K. Ia. Kondratev, A. A. Buznikov, O. B. Vasilev, B. V. Vinogradov, V. M. Orlov, V. I. Sevastianov, and O. I. Smoktii [1972] 12 p refs Transl. into ENGLISH from Kosmich. Issled. (Moscow), v. 10, no. 2, 1972 p 245-254
Avail: NTIS HC $3.00; National Translations Center, °John Crerar Library, Chicago, Ill. 60616

Results are presented of spectrophotometry of natural formations on the earth's surface, based on data obtained by the manual RSS-2 spectrograph, on the manned Soyuz 9 spacecraft. The results are compared with those obtained from ground-based spectrophotometers. Author

N72-32467# Joint Publications Research Service, Arlington, Va.
RADIATION SENSOR COOLING DEVICES
Ye. I. Antonov and V. Ye. Ilin 15 Sep. 1972 42 p Transl. into ENGLISH from "Ustroystva dlya Okhlazhdeniya Priyemnikov Izlucheniya" Leningrad, 1969 p 118-125 and 157-187
(JPRS-57028) Avail: NTIS HC $4.25

Freon throttling, problems of stabilizing refrigerating temperature, high pressure fittings, expansion engines with performance of outside work, expansion engines without performance of outside work, refrigeration units operating on a reverse Stirling cycle, and piston gas compression engines are considered. Author

N72-32468# Department of Supply, Melbourne (Australia).
A VARIABLE MOVEMENT SPECIMENT HOLDER FOR TEXTURE STUDIES
B. E. Williams Apr. 1972 11 p
(ARL/Met-81) Avail: NTIS HC $3.00

A device is described in which the motion for examining fiber textures, as in drawn wires, combines rotation with vertical oscillation such that each vertical sweep beings at a new point on the specimen. This motion effectively scans completely a specimen surface over a 1 cm length and thus, in principle, enables all grains in the length to give reflections. For sheet specimens, the motion can be changed to vertical oscillation only. Rotation alone can also be obtained. The device fits a Unicam S25 goniometer and is small enough to be used inside a 6 cm diameter cylindrical camera. Author

N72-32469*# National Aeronautics and Space Administration, Washington, D.C.
SENSITIVITY OF RADIOTELESCOPES AND CORRELATION RECEIVERS
E. J. Blum Jun. 1972 38 p refs Transl. into ENGLISH from Ann. d'Astrophys. (France), v. 22, no. 2, Mar.-Apr. 1959 p 140-163
(NASA-TT-F-14441) Avail: NTIS HC $4.00 CSCL 20F

The existence of at least two classes of radio telescopes, comparison and correlation, and the sensitivity of their antennas and receivers are demonstrated. Comparisons of the two types and methods of selecting the type best suited for a particular experiment are described. A.L.

N72-32470*# National Aeronautics and Space Administration, Washington, D.C.
A NEW INSTRUMENT WITH A SPHERICAL ATTACHMENT FOR THE MEASUREMENT OF UV-RADIATION INCIDENCE AT AN ARBITRARY ANGLE
K. Larche Jul. 1972 8 p refs Transl. into ENGLISH from Licht (West Ger.), v. 12, 1942 p 110-111
(NASA-TT-F-14416) Avail: NTIS HC $3.00 CSCL 14B

A description is given of an instrument designed to measure UV radiation incident on a plane in rooms and test installations. The instrument has a special spherical attachment that provides the sensitivity and accuracy needed for such measurements. E.H.W.

N72-32471*# National Aeronautics and Space Administration, Washington, D.C.
ON AN INSTRUMENT FOR THE MEASUREMENT OF ULTRAVIOLET RADIATION EQUIPPED WITH A SPHERICAL ATTACHMENT FOR THE MEASUREMENT OF RADIATION INCIDENT AT A LARGE ANGLE
Kurt Larche and R. Schulze Jul. 1972 13 p refs Transl. into ENGLISH from Z. Tech. Phys. (Leipzig), V. 23, 1942 p 114-117
(NASA-TT-F-14418) Avail: NTIS HC $3.00 CSCL 14B

The UV-instrument developed by Krefft and Roessler is described as consisting of selenium-barrier layer cells, glass, and liquid filters, and suitable for incident radiation at large angles, when using a spherical attachment. Up to incident angles of 70 deg, the sensitivity of the instrument is proportional to the cos of the angle of incidence. The usefulness of the instrument for technical and climatological measurements is shown in a few examples. Author

N72-32472*# Texas A&M Univ., College Station. Remote Sensing Center.
ON THE PERFORMANCE OF INFRARED SENSORS IN EARTH OBSERVATIONS
L. F. Johnson Aug. 1972 151 p refs
(Contract NAS9-11155; Grant,NGR-44-001-001)
(NASA-CR-128416; TR-RSC-37) Avail: NTIS HC $9.75 CSCL 14B

The performance of infrared sensing systems is dependent upon the radiative properties of targets in addition to constraints imposed by system components. The unclassified state-of-the-art of infrared system performance figures is reviewed to indicate the relevance to system performance of target radiative properties. A theory of rough surface scattering is developed which allows the formulation of the reflective characteristics of extended targets. The thermal radiation emission from extended targets is formulated on the basis of internal radiation characteristics of natural materials and the transmissive scattering effects at the surface. Finally, the total radiative characteristics may be expressed as functions of material properties and incident and received directions, although the expressions are extremely complex functions and do not account for the effects of shadowing or multiple scattering. It is believed that the theory may be extended to include these effects and to incorporate the local radii of curvature of the surface. Author

N72-32473*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FABRICATION AND TESTING OF SCATTER PLATES FOR INTERFEROMETRY
Joseph J. Pour, Sr. and John R. Pitts 30 Jun. 1972 11 p
(NASA-TM-X-64691) Avail: NTIS HC $3.00 CSCL 14B

Scatter plate interferometry has become a reliable method of measuring surface configurations of telescope mirrors and other optical components. The scatter plate used in an instrument should be of optimum quality if the surface it is being used to measure is to be of high accuracy. Tests were performed and results show that, although many scatter plates would function, few were of the optimum quality necessary. These few were of the 180 grit group, using 35- and 30-s exposures, which are figures derived from calculations. Author

N72-32474*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CALIBRATION OF RADIATION DETECTORS IN THE ULTRAVIOLET REGION BETWEEN 972 AND 2500 A
James O. McClenahan Washington Sep. 1972 16 p refs
(NASA-TN-D-6991; A-4456) Avail: NTIS HC $3.00 CSCL 14B

The development of experimental setups and procedures is considered for calibrating photosensitive devices in the spectral range 1022 to 2500 A for which no direct calibration techniques exist. An indirect technique that uses a sodium salicylate detector calibrated outside this range was developed for use as a secondary standard. The primary standard was a xenon-filled

ionization chamber, which is an absolute standard over the wavelength interval 972 to 1022 A. Measurements made by this method were checked at 1470 A with a xenon lamp and at 2537 A with a mercury arc lamp and a 0.5 m blaze monochromator with a grating blazed at 2000 A. The overall accuracy of the measurements was + or - 40 percent or better. Author

N72-32475*# Kanner (Leo) Associates, Redwood City, Calif.
CONCERNING THE DETERMINATION OF THE SENSITIVITY OF HOT WIRE ANEMOTHERMOMETERS IN SUPERSONIC FLOWS
Jean Gaviglio Washington NASA Mar. 1972 6 p refs Transl. into ENGLISH from Compt. Rend. Acad. Sci. (Paris), Ser. A, v. 273, no. 14, 1971 p 634-637 Sponsored by NASA
(NASA-TT-F-14458) Avail: NTIS HC $3.00 CSCL 14B

Two methods are mentioned which are used to determine the sensitivity of hot-wire anemothermometers used to analyze the turbulence of supersonic flows. One method is imprecise with the lower Reynolds numbers, but the application is relatively easy; the other is precise, however, difficult to implement. New results from experiments allow the respective advantages of these two methods to be combined. Author

N72-32476# Army Aeromedical Research Lab., Fort Rucker, Ala.
HELICOPTER IN-FLIGHT MONITORING SYSTEM
Harlie W. Huffman, Mark A. Hofmann, and Michael R. Sleeter Mar. 1972 42 p
(DA Proj. 3A0-62110-A-819)
(AD-745118; USAARL-72-11) Avail: NTIS HC $4.25 CSCL 14/2

A helicopter in-flight monitoring system is described. This system measures and records in real time, all six degrees of freedom of the aircraft, cyclic, collective, and pedal inputs as well as some status values. Author

N72-32477# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions.
TELESCOPE FOR RECORDING SMALL ENERGY PROTONS ON THE INTENSE BETA BACKGROUND
D. D. Bogdanov, V. A. Karnaukhov, and L. A. Petrov 1972 8 p ref In RUSSIAN
(JINR-P13-6261) Avail: AEC Depository Libraries

A telescope is described which consists of two plane proportional counters and a semiconductor detector. The telescope is intended for low-energy (0.5 to 6.0 MeV) proton spectrometry in the presence of an intense background of beta and gamma radiation. Use of the proportional counters in the controlling coincidence channel reduces considerably the beta-gamma background of the semiconductor detector in comparison with the case when only one counter is used. Author (NSA)

N72-32478# California Univ., Livermore. Lawrence Livermore Lab.
ACCELEROMETERS FOR THE MISTY NORTH EVENT
Henry Freynik 5 Apr. 1972 9 p Presented at the Underground Nucl. Test Measurement Symp. 2, Menlo Park, Calif., 21-22 Mar. 1972 Sponsored by AEC
(UCRL-73654; CONF-720312-8) Avail: NTIS

The design philosophy and the laboratory experiments to qualify accelerometers for the Misty North event are discussed. The principal difficulty is the necessity to measure low frequency, low amplitude accelerations in the presence of high frequency shocks. In past experiments high frequency shocks have too often excited ringing in the accelerometers. Most accelerometers were radiation-hardened Endevco 2264/2266 piezoresistive accelerometers. Author (NSA)

N72-32479# Los Alamos Scientific Lab., N.Mex.
NANOSECOND FRAMING CAMERAS USING PROXIMITY FOCUSED IMAGE INTENSIFIERS
H. Dean Sutphin and Albert J. Lieber Apr. 1972 5 p refs
(Contract W-7405-eng-36)
(LA-4937) Avail: NTIS

Two high-speed framing cameras were developed using proximity focused image intensifiers. Both cameras have low jitter and easily adjustable frame separation from overlapping to several times the frame duraction. Spatial resolution for both cameras is 10 line pairs/mm on the intensifier photocathodes. Frame durations are 10 nsec for the first generation camera and 5 nsec for the second generation camera. Author

N72-32480# Aerospace Corp., El Segundo, Calif. Lab. Operations.
THIN FOIL CALORIMETERS FOR THE MEASUREMENT OF ENERGY DEPOSITION PROFILES AND SPATIAL FLUENCE DISTRIBUTIONS OF LOW ENERGY PULSED ELECTRON BEAMS
Wendell M. Graven, Winston C. Burns, and Ronald V. Peterson 23 Mar. 1972 38 p refs
(Contract F04701-71-C-0172)
(AD-743838; TR-0172(2250-30)-3; SAMSO-TR-72-109) Avail: NTIS CSCL 18/4

A thin-foil calorimeter designed to measure energy deposition profiles for electrons with ranges less than 100 micrometers has been tested with two pulsed electron beams. In addition to the diagnostic determination of the beam spectra obtained from the measured deposition profiles, the spatial fluence patterns of the beams have been measured with a total-stopping calorimeter array. The calorimeters are capable of operation over a dose range of a few kilorads to nearly 100 Mrad. Fluence measurements with the calorimeters can be made accurately with the error probably not exceeding 2 percent. In contrast, the dose-path measurements are less accurate although the probable error has not been determined. Author (GRA)

N72-32481# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HIGH VOLTAGE PULSE GENERATOR
V. G. Bagramov, D. V. Iremashvili, N. I. Leontyev, V. I. Petrunin, and A. I. Smirov 13 Mar. 1972 14 p refs Transl. into ENGLISH from Elektrofiz. App., Sb. Statei (USSR), no. 8, 1969 p 146-151
(AD-744154; FTD-HT-23-1195-71) Avail: NTIS CSCL 14/2

The purpose of this paper is to investigate the possibility of creating a generator based on a circuit for forming trapezoidal-shaped pulses with an amplitude of 250-300 kV, and with the duration of the flat segment of 100 ns. A simplified circuit of the generator, based on the principle of multiplying a voltage in coaxial cables connected in parallel at the input and in series at the output, is shown. The generator consists of the following basic units: a high-voltage rectifier, shaper line, commutating thyratons, transforming line, and decoupling choke. GRA

N72-32482# Army Foreign Science and Technology Center, Charlottesville, Va.
NEW THEODOLITES AND TELESCOPIC RANGE FINDERS
A. I. Zakharov 4 May 1972 256 p refs Transl. into ENGLISH from the book "Novye Teodolity i Optich. Dalnomery" Moscow, 1970 232 p
(AD-744511; FSTC-HT-23-1428-72) Avail: NTIS CSCL 17/8

A detailed study was made of the design of optical theodolites and range finder instruments, their schematics, operating rules, rules for checking and adjusting, possible failures and methods of eliminating them. Recommendations are made with respect to maintenance of the instruments: cleaning and lubricating. The procedures for dismantling and assembling the primary units for repair is discussed. Primary attention has been given to the layout and checking of the primary parts of the theodolite: the telescope, axes, levels and azimuth circles. Operating principles are investigated in the section on telescopic range finders, and the primary sources of error are analyzed. Recommendations are made with respect to reducing or eliminating these errors. Author (GRA)

N72-32483# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
A TECHNIQUE FOR MEASURING IN-PLANE DISPLACEMENTS BY HOLOGRAPHIC INTERFEROMETRY Technical Report, Jan. - Sep. 1971
Frank D. Adams and Richard R. Corwin Feb. 1972 32 p refs
(AF Proj. 1467)
(AD-744490; AFFDL-TR-72-5) Avail: NTIS CSCL 14/2

An experimental technique for measuring in-plane displacements from a single hologram is described. The method is based upon imaging the entire wave reflected from a single point and recorded on a hologram. Experimental results are presented. Application and limitations of the technique are discussed. Author (GRA)

N72-32484# ARO, Inc., Arnold Air Force Station, Tenn.
THE DEVELOPMENT OF A TEMPERATURE MEASURING PROBE FOR USE IN A TWO-PHASE (GAS-LIQUID) ENVIRONMENT Final Report
John M. Pelton, H. K. Clark, and R. A. Paulk AEDC Jun. 1972 47 p refs
(Contract F40600-72-C-0003; ARO Proj. RW0856; ARO Proj. RW2116; ARO Proj. RW2216)
(AD-744513; ARO-ETF-TR-71-228; AEDC-TR-72-19) Avail: NTIS CSCL 14/2

A series of aspirating thermocouple probes was designed and built to measure the gas temperature in a two-phase (gas-liquid) system similar to that encountered in a jet engine exhaust gas spray color. These probes were tested over a wide range of flow conditions to determine the probe performance and to determine the influences of probe size, relative flow angle, and aspiration pressure ratio on the temperatures measured by the probe. The final configuration of the aspirating thermocouple measured the gas phase temperature over the range from 710 to 81 degrees R when operating at liquid-to-gas flow rates from 0.13 to 2.3, at 13.0-psia pressure and free-stream Mach numbers in the range from 0.05 to 0.08. Author (GRA)

N72-32485# HRB-Singer, Inc., State College, Pa.
DIGITAL PROCESSING OF IR SCANNER VIDEO Annual Progress Report, Dec. 1971 - May 1972
Clifford P. Bastuscheck 15 May 1972 48 p
(Contract N00014-71-C-0296; NR Proj. 387-057)
(AD-744332; HRB-4567-R-2) Avail: NTIS CSCL 17/5

Infrared line-scan video signals, collected during a 24-hour period in February, were processed in the computer programs developed on prior studies. The diurnal effects on the calculated parameters were demonstrated to be quite large, and could mask some activity changes. Large activity changes including the generation of heat in the target area would be discernible, particularly for night conditions; however the effect of sunlight may mask changes during the day if some prior history of temperature distributions in the target and the weather conditions are not known. Author (GRA)

N72-32486# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN ADIABATIC CALORIMETER FOR CONTACT CALIBRATION OF HEAT FLUX SENSORS
O. A. Gerashnchenko, V. G. Krapenko, and E. A. Tatarinov 26 Apr. 1972 9 p refs Transl. into ENGLISH from Teplofiz. i Teploteh. (USSR), no. 16, 1970 p 83-86
(AF Proj. 1426)
(AD-744178; FTD-MT-24-1166-71) Avail: NTIS CSCL 14/2

The characteristics of calibrating heat flux sensors by radiation and contact methods are examined. Described are the design and theory of a quick-response adiabatic calorimeter with automatic compensation for heat losses, developed in the Institute of Technical Heat Physics of the AS USSR. As the zero-indicator, monitoring the presence of heat leaks in the calorimeter, a high-discrimination thermoelectric battery with a given number of microelements is used, which prevents heat losses of the calorimeter from exceeding 0.1-0.2 percent. The calorimeter was designed for contact calibration of heat flux sensors. Author (GRA)

15 MACHINE ELEMENTS AND PROCESSES

Includes bearings, seals, pumps, and other mechanical equipment; lubrication; friction, and wear; manufacturing processes and quality control, and reliability; drafting; and materials fabrication, handling, and inspection.

N72-32487* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
DEPOSITION APPARATUS Patent
Joseph H. Judd and Raymond L. Clark, inventors (to NASA) Issued 12 Sep. 1972 5 p Filed 28 Apr. 1971 Supersedes N71-34456 (09 - 21, p 3437)
(NASA-Case-LAR-10541-1; US-Patent-3,690,291; US-Patent-Appl-SN-138229; US-Patent-Class-118-49.1; US-Patent-Class-204-298; US-Patent-Class-219-121P; US-Patent-Class-219-273) Avail: US Patent Office CSCL 13H

A feed wire is evaporated into contact with a central portion of an evaporator filament having an electric current passing through it. An electrical potential difference is maintained between the wire and one side of the filament whereby the vapor is ionized. Official Gazette of the U.S. Patent Office

N72-32488 National Lending Library for Science and Technology, Boston Spa (England).
INVESTIGATION OF SINGLE TRACES OF IMPACT AND PRODUCTS OF WEAR IN ABRASIVE EROSION
Kh. Kh. Uuemyis and I. R. Kleis Jul. 1972 13 p refs Transl. into ENGLISH from Tr. Tallinsk. Politekhn. Inst. (Tallin), v. 294, 1970 p 35-49
(NLL-RTS-7374) Avail: Natl. Lending Library, Boston Spa, Engl.: £ 1.30 or 4 NLL photocopy coupons

The investigation of single traces of impact on the surface of thin-section test pieces and the products of wear are discussed in terms of the nature of the breakdown of surface layers during abrasive erosion. The use of a combined method of investigation by means of profilograph recordings and microphotographs in the range of angles of attack between 3 and 90 degrees and at collision speeds of 50 to 225 meters per second. Author

N72-32489*# Geological Survey, Denver, Colo.
A STUDY OF QUATERNARY LANDFORMS AND MATERIALS IN THE MIDWEST AND GREAT PLAINS Progress Report, 1 Jul. - 31 Aug. 1972
Roger B. Morrison, Principal Investigator and George R. Hallberg 1 Sep. 1972 3 p Sponsored by NASA
(E72-10105; NASA-CR-128154) Avail: NTIS HC $3.00 CSCL 08G

There are no author-identified significant results in this report.

N72-32490*# ESL, Inc., Sunnyvale, Calif.
DEVELOPMENT OF OPTIMIZED TECHNIQUES AND REQUIREMENTS FOR COMPUTER ENHANCEMENT OF STRUCTURAL WELD RADIOGRAPHS. VOLUME 1: TECHNICAL REPORT
John R. Adams, Sandra W. Hawley, Glenn R. Peterson, Sheldon S. Salinger, and Ronald A. Workman 5 Mar. 1971 154 p refs (Contract NAS8-25590)
(NASA-CR-123814; ESL-TM213-Vol-1) Avail: NTIS HC $9.75 CSCL 13H

A hardware and software specification covering requirements for the computer enhancement of structural weld radiographs

was considered. Three scanning systems were used to digitize more than 15 weld radiographs. The performance of these systems was evaluated by determining modulation transfer functions and noise characteristics. Enhancement techniques were developed and applied to the digitized radiographs. The scanning parameters of spot size and spacing and film density were studied to optimize the information content of the digital representation of the image. Author

N72-32491*# General Electric Co., Daytona Beach, Fla. Space Div.
MECHANICAL SYSTEMS READINESS ASSESSMENT AND PERFORMANCE MONITORING STUDY Final Report
19 May 1972 338 p refs
(Contract NAS10-7788)
(NASA-CR-128171) Avail: NTIS HC $19.00 CSCL 22B

The problem of mechanical devices which lack the real-time readiness assessment and performance monitoring capability required for future space missions is studied. The results of a test program to establish the feasibility of implementing structure borne acoustics, a nondestructive test technique, are described. The program included the monitoring of operational acoustic signatures of five separate mechanical components, each possessing distinct sound characteristics. Acoustic signatures were established for normal operation of each component. Critical failure modes were then inserted into the test components, and faulted acoustic signatures obtained. Predominant features of the sound signature were related back to operational events occurring within the components both for normal and failure mode operations. All of these steps can be automated. The structure borne acoustics technique lends itself to reducing checkout time, simplifying maintenance procedures, and reducing manual involvement in the checkout, operation, maintenance, and fault diagnosis of mechanical systems. Author

N72-32492*# Scientific Translation Service, Santa Barbara, Calif.
HUMAN-LIKE MACHINES
Karl-Heinz Droege Washington NASA Aug. 1972 15 p Transl. into ENGLISH from Tech. Rundsch. (Swtizerland), no. 22, 26 May 1972 p 45, 49, 51
(Contract NASw-2035)
(NASA-TT-F-14553) Avail: NTIS HC $3.00 CSCL 13I

Applications of teleoperator machines (remote manipulators) and robots in various areas of technology are described. The Syntelmann teleoperator is discussed in detail. Author

N72-32493*# Scientific Translation Service, Santa Barbara, Calif.
AUTOMATIC MECHANICAL HANDS
H. VonMuldau Washington NASA Aug. 1972 13 p Transl. into ENGLISH from Tech. Rundsch. (Switzerland), no. 22, 26 May 1972 p 41, 43, 45
(Contract NASw-2035)
(NASA-TT-F-14554) Avail: NTIS HC $3.00 CSCL 13I

Design and application of multi-finger mechanical hands and robots in industry are discussed. Author

N72-32494# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION IN THE WELDMENT OF HIGH PRESSURE HIGH TEMPERATURE TUBE
L. X. Nepomuceno 29 May 1972 6 p In PORTUGUESE; ENGLISH summary
(TR-7205.584) Avail: NTIS HC $3.00

A description of the inspected weldment is presented, with the equipment and accessories used. Equipment adjustment and calibration are discussed, and the results obtained are presented in schematic drawing form, accompanied by photos of the observed echograms in the defective and sound zones. Author

N72-32495*# Ampex Corp., Redwood City, Calif.
THERMAL EFFECTS ON THE CLEARANCE AND STIFFNESS OF FOIL JOURNAL BEARINGS FOR A BRAYTON CYCLE TURBOALTERNATOR
A. Eshel Washington NASA Sep. 1972 62 p refs
(Contract NAS3-15341)
(NASA-CR-2113; E-6976) Avail: NTIS HC $3.00 CSCL 13I

An analysis of foil journal bearings for a NASA Brayton Cycle Unit (BRU) is presented. The study represents an extension of previous work in that it includes the effects of thermal expansion of foil-bearing components, as well as an improved model of the influence of foil flexure. The results presented give the bearing film thickness, the bearing stiffness, and the foil tension as functions of the operating temperatures and the elasto-hydrodynamic and geometrical parameters pertinent to the design of BRU foil bearings. A computer program for the evaluation of design data and for parametric studies is included. Author

N72-32496# Royal Aircraft Establishment, Farnborough (England).
ELECTROCHEMICAL STUDIES ON THE CAUSE OF HYDROGEN-EMBRITTLEMENT BY Zn-CYANIDE PLATING. PART 2: STUDIES OF HYDROGEN-EMBRITTLEMENT OF STEEL ELECTROLYTICALLY PLATED BY THE Zn CYANIDE PROCESS
Tomito Fukamachi and Keiichi Terashima Jul. 1972 12 p refs Transl. into ENGLISH from J. Metal Finishing Soc. Japan (Tokyo), v. 21, 1970 p 644-647
(RAE-Lib-Trans-1644-Pt-2) Avail: NTIS HC $3.00

Hydrogen-embrittlement caused by Zn-cyanide plating process was stronger than that by the acidic process in the same current efficiency. Therefore, the embrittlement by the former process seemed to be caused by other factors than the amount of hydrogen discharged. At first, electrolytic conditions in the process of plating were studied for hydrogen or zinc polarization by potentiostatic method in the eight baths reported in the previous paper. The results obtained were as follows: (1) The degree of brittleness of the specimens corresponded well with that of the hydrogen polarization before Zn deposition. Then, the cause of embrittlement was considered to be the action of hydrogen discharged on the naked iron cathode of low hydrogen overvoltage. (2) From the results of equilibrium potential measurements and activity of OH, it was concluded that most of Zn from so-called Zn-cyanide bath was deposited from zincate solution. Author

N72-32497*# Translation Consultants, Ltd., Arlington, Va.
A DETERMINATION OF THE DISPLACEMENTS, ANGLES OF CONTACT, STRESSES, AND BENDING MOMENTS IN RADIAL-THRUST BEARINGS
M. I. Kurushin Washington NASA Sep. 1972 9 p refs Transl. into ENGLISH from Dinam. i Prochnost Mashin (Kharkov), no. 7, 1966 p 72-78
(Contract NASw-2038)
(NASA-TT-F-14556) Avail: NTIS HC $3.00 CSCL 13I

The use of geometry to derive expressions for angles of contact and contact approaches for radial ball bearings is described. Curves suitable for all bearings with the same number of balls and relative clearances are plotted. Author

N72-32498*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PUMP FOR DELIVERING HEATED FLUIDS Patent Application
Eric E. Sabelman, Inventor (to NASA) Filed 26 Feb. 1971 24 p
(Contract NAS7-100)
(NASA-Case-NPO-11417; US-Patent-Appl-SN-119282) Avail: NTIS HC $3.25 CSCL 13I

The design and development of a thermal-mechanical pump for use in pumping a warming fluid through a fluid circuit for heating instrumentation aboard spacecraft are discussed. The

device uses an astable pump capable of extracting heat from a fluid heated by an RTG unit for performing mechanical work. By employing heat given up by the warming fluid as a source of energy, the pump can continuously control the temperature of spacecraft instrumentation. NASA

N72-32499# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATION OF THE MOVEMENT OF A WALKING APPARATUS
D. Ye. Okhotsimskiy, A. K. Platnov, G. K. Borovin, and I. I. Karpov 14 Sep. 1972 20 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Tekhn. Kibern. (Moscow), no. 3, 1972 p 47-59
(JPRS-57018) Avail: NTIS HC $3.00

A multilevel adaptive algorithm for controlling the movement of a six-legged automatic machine capable of traversing an uneven surface is investigated. Simulation is performed on an electronic computer. A conventionalized image of the motion of the device over terrain, obtained on a display screen, allows the efficiency of proposed algorithms to be judged. Author

N72-32500*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ENHANCED DIFFUSION WELDING Patent Application
Kenneth H. Holko and Thomas J. Moore, inventors (to NASA) Filed 14 Sep. 1972 12 p
(NASA-Case-LEW-11388-1; US-Patent-Appl-SN-289033) Avail: NTIS HC $3.00 CSCL 13H

Surfaces of unrecrystallized alloys are sanded and polished. This is followed by a two-step welding process wherein the strength of the parent metal is retained at the weld joint. The first step forces the surfaces into intimate contact at a temperature at which the metal still has good ductility. The second step causes diffusion, recrystallization, and grain growth across the original weld interface. NASA

N72-32501*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ROCKET CHAMBER AND METHOD OF MAKING Patent Application
Anthony Fortini, inventor (to NASA) Filed 14 Sep. 1972 10 p
(NASA-Case-LEW-11118-1; US-Patent-Appl-SN-289050) Avail: NTIS HC $3.00 CSCL 13H

A transpiration-cooled rocket chamber is made by forming a porous metal wall on a suitably shaped mandrel. The porous wall may be made of sintered powdered metal, metal fibers sintered on the mandrel, or wires woven onto the mandrel and then sintered to bond the interfaces of the wires. Intersecting annular and longitudinal ribs are then electroformed on the porous wall. An interchamber wall having orifices therein is then electroformed over the annular and longitudinal ribs. Parallel longitudinal ribs are then formed on the outside surface of the interchamber wall, after which an annular jacket is electroformed over the parallel ribs to form distribution passages therewith. A feed manifold communicating with the distribution passages may be fabricated and welded to the rocket chamber or the feed manifold may be electroformed in place. NASA

N72-32502*# Bell Aerospace Co., Buffalo, N.Y.
NONDESTRUCTIVE TEST OF REGENERATIVE CHAMBERS Final Report
G. A. Malone, R. Stauffis, and R. Wood Jul. 1972 132 p refs (Contract NAS3-14376)
(NASA-CR-120980; BAC-8654-953003) Avail: NTIS HC $8.75 CSCL 14D

Flat panels simulating internally cooled regenerative thrust chamber walls were fabricated by electroforming, brazing and diffusion bonding to evaluate the feasibility of nondestructive evaluation techniques to detect bonds of various strength integrities. Ultrasonics, holography, and acoustic emission were investigated and found to yield useful and informative data regarding the presence of bond defects in these structures. Author

N72-32503# Curtiss-Wright Corp., Wood-Ridge, N.J.
IMPROVED MANUFACTURING METHOD FOR PROCESSES FOR SUPER FINISHED SPUR AND HELICAL GEARS Final Report, 7 Aug. 1969 - 7 Mar. 1971
Neil DeBruyne 1972 93 p
(Contract DAAJ01-70-C-0171)
(AD-742655; CW-WR-69-114 F) Avail: NTIS CSCL 13/9

The report presents the results of an experimental program which evaluates the scuffing resistance properties of a conventional (AISI 9310) and an advance high hot hardness steel (Vasco-Jet 1000-2) gear material when various surface treatments and methods of surface finishes are used. Author (GRA)

N72-32504# Defense Documentation Center, Alexandria, Va.
SEALS Report Bibliography, Jun. 1955 - Jan. 1972
Jun. 1972 333 p refs Supersedes DDC-TAS-70-41-1
(AD-744050; DDC-TAS-72-4421; DDC-TAS-70-41-1) Avail: NTIS CSCL 11/1

The bibliography is a compilation of references and Seals. Some of the topics covered are: Development of seals for advanced-design-launching system, basic research in dynamic sealing, bearing and seal technology review, fluid seals for high-speed rotating equipment, dynamic shaft seals in space, hermetic seals in plastic bodied connectors, gasketing media at ultra-high pressure, study of O-Ring aging characteristics, and a vacuum seal for non-circular tubes. Author (GRA)

N72-32505# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATIONS OF FRICTION AND WEAR BEHAVIOR OF PM-METAL-GRAPHITE SYSTEMS
H. Rebsch and M. Kuehnel 10 Feb. 1972 21 p refs Transl. into ENGLISH from the publ. "International Powder Metallurgy Conference Karlovy Vary CSSR, 1970, vol. 3," 1970, USSR p 214-233
(AF Proj. 7343)
(AD-744141; FTD-HC-23-1814-71) Avail: NTIS CSCL 11/6

The paper deals with the effect of graphite on friction properties and wear of the sintered materials based on iron, nickel, cobalt, copper, bronze and aluminum. The results obtained are graphically demonstrated and discussed in terms of present conceptions and theories of friction and wear mechanisms. Author (GRA)

N72-32506# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SURFACE HARDENING OF BEARING STEEL
D. D. Papshev and A. M. Pikovskii 4 Apr. 1972 12 p refs Transl. into ENGLISH from "Povysheniye Prochnosti i Dolgovechnosti Detaley mashin" Moscow, Tsent. Nauch.-Issled. Inst., 1969 p 129-135
(AD-744256; FTD-HC-23-1999-71) Avail: NTIS CSCL 13/8

Results are presented from a study on the prospects for increasing longevity of bearings by strengthening their working surfaces by surface hardening, as well as a study of the effect that rolling has on surface roughness, hardness, residual stresses, machining precision, and wear resistance under rocking friction conditions. GRA

N72-32507# Franklin Inst., Philadelphia, Pa.
DERIVATION OF A FATIGUE LIFE MODEL FOR GEARS Final Report, 25 Jun. 1970 - 25 Nov. 1971
John H. Rumbarger and Larry Leonard May 1972 130 p refs
(Contract DAAJ02-70-C-0068; DA Proj. 1G1-62203-D-144)
(AD-744504; FIRL-F-C2864; USAAMRDL-TR-72-14) Avail: NTIS CSCL 13/9

A load-life model is developed for calculating the fatigue life and reliability of a spur gear mesh. The dynamic capacity of a gear mesh is defined as the tangential load which can be transmitted for one million pinion revolutions with a 90% probability of survival. The model is an extension of the currently accepted Lundberg-Palmgren Rolling Element Bearing Life Model.

Limited rolling contact testing of cylindrical samples with and without traction in the contact was accomplished. At a low coefficient of traction (below 0.1), no statistically significant effect on fatigue life was noted. Scanning electron microscopy studies were performed of all test samples. One rolling test sample was SEM examined periodically during testing to observe initiation and progression of failure. Numerical examples are presented for the calculation of the dynamic capacity of a standard contact ratio and a high contact ratio spur gear mesh.
Author (GRA)

N72-32508# Florida Univ., Gainesville. Dept. of Industrial and Systems Engineering.
SYSTEMS ENGINEERING APPLIED TO THE ANALYSIS OF CONTINUOUS FLOW CONVEYORS
Eginhard J. Muth Apr. 1972 40 p refs
(Contract DAHC04-68-C-0002)
(AD-744529; TR-64; AROD-T-1-90-RT) Avail: NTIS CSCL 13/8

A closed-loop conveyor system, having a single loading station, a single unloading station, and operating with time-varying input and output flow rates, is analyzed. The balance of flow on the conveyor is represented by a difference equation. Solutions of that difference equation appear naturally in terms of a Fourier series expansion. An important description of the system is its frequency response. Singularities in the frequency response represent cases of incompatibility. It is shown that incompatibility depends on the ratio T/P of conveyor period to work-cycle period, and on the presence of harmonics in input and output flow rates. Solutions for several specific cases are presented graphically.
Author (GRA)

N72-32509# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOLUTION OF PROBLEMS FROM THE THEORY OF GAS LUBRICATION BY THE EQUIVALENT EQUATION METHOD
Ya. M. Kotlyar 5 Apr. 1972 12 p refs Transl. into ENGLISH from Gaz. Smazka Podshipnikov (USSR), no. 9, 1968 p 265-272
(AF Proj. 7343)
(AD-744264; FTD-HC-23-110-72) Avail: NTIS CSCL 11/8

Analytical solutions were derived using the equivalent equation method. The results were compared with results obtained by numerical methods and were found to be in close agreement.
Author (GRA)

N72-32510# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF WATER LUBRICATED FRICTION BEARINGS MADE OF REINFORCED EPOXY COMPOSITION
V. G. Tverdokhleb 24 Mar. 1972 8 p refs Transl. into ENGLISH from Tekhnol. Organ. Proizvod. (Kiev), no. 6, 1970 p 98-100
(AD-744289; FTD-HC-23-1846-71) Avail: NTIS CSCL 13/9

The article presents the results of studies of the antifriction properties and wear resistance of friction bearings made of reinforced K-153 epoxy compound. The compound was reinforced with cotton fabric by winding and hardened with reinforced polyamine. The bearings were compared with bearings made of secondary capron, polyamide 68 and metallurgical textolite. The nature of change in coefficient of friction with friction speed is the same for the new material as for the older materials tested. Coefficient of friction at first decreases, than remains almost constant with increasing friction speed. The tests indicated that the new bearings have significantly greater service life and operational qualities than the older materials tested.
Author (GRA)

N72-32511# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ASYMPOTIC SOLUTION OF PROBLEMS OF GAS LUBRICATION OF HIGH SPEED BEARINGS WITH INJECTION
I. E. Sipenlov 5 Apr. 1972 16 p refs Transl. into ENGLISH from Gaz. Smazka Podshipnikov (USSR), no. 9, 1968 p 49-62
(AF Proj. 7343)
(AD-744293; FTD-HC-23-112-72) Avail: NTIS CSCL 13/9

It was found that the following two pressurization versions are most preferable in high-speed sectional bearings: a continuous pressurization distribution along the whole streamlined surface of the working section; and a cascade pressurization system consisting of one or several rows of feeding apertures located along lines perpendicular to the sliding direction. Calculation results are presented.
Author (GRA)

N72-32512# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF GAS FLOW IN THE LUBRICANT LAYER OF A GAS STATIC BEARING
G. P. Dmitriev 11 Apr. 1972 16 p refs Transl. into ENGLISH from Gaz. Smazka Podshipnikov (USSR), no. 9, 1969 p 229-241
(AF Proj. 7343)
(AD-744294; FTD-HC-23-124-72) Avail: NTIS CSCL 13/9

The carrying capacity of a gas static bearing depends on the pressure in the lubricating layer at known initial parameters (pressure and temperature) of the gas and on the bearing dimensions. Experimental and theoretical investigations were carried out to determine the pressure distribution in the lubricating layer, to obtain analytical functions for engineering calculations, and to evaluate the performance of the designed bearings. The findings and detailed design recommendations are given.
Author (GRA)

N72-32513# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ABRASIVE WEAR
M. M. Khrushchov and M. A. Babichev 23 Mar. 1971 327 p refs Transl. into ENGLISH from the monograph "Abrazivnoe Iznashivanie" Moscow, 1970 p 1-252
(AF Proj. 7343)
(AD-744182; FTD-24-1182-71) Avail: NTIS CSCL 13/9

This monograph gives a general classification of the various types of wear, including abrasive wear; it describes the principles and systems of laboratory tests for abrasive wear, the regularities of this form of wear under various conditions - during friction against attached abrasive particles, against a seam, against an abrasive mass, during wear of streams of abrasive particles, in gas and liquid flows, and during impact-abrasive wear. The book presents the data of tests by various methods for the wear of hard facings, and it determines the connection of abrasive wear resistance with the physical properties of materials.
Author (GRA)

N72-32514# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CONSIDERATION OF HIGH-SPEED STRAIN HARDENING OF A METAL DURING PRESSURE SHAPING FROM SPECIMEN TEST DATA
G. G. Tyulenev and S. N. Vysokosovskii 22 Mar. 1972 7 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Chernaya Met. (Moscow), no. 3, 1971 p 65-66
(AF Proj. 7351)
(AD-744185; FTD-HT-23-404-72) Avail: NTIS CSCL 13/8

The deformation resistance of steels and alloys is frequently estimated by reference to the behaviour of cylindrical samples, and the data thus obtained are transferred directly to the case of metal rolling and forging, in which the conditions of deformation are essentially different, e.g. The high speed deformation associated with rolling and forging differs from the type of deformation applied in the tests. Substantial errors in deformation resistance thus accrue. The high speed effects of rolling and forging may, however, be taken into account when testing cylindrical samples by appropriately adjusting the test conditions. Methods of doing this are indicated.
Author (GRA)

N72-32900* AiResearch Mfg. Co., Torrance, Calif.
HIGH PRESSURE TURBINE BLADE STRESS ANALYSIS
Robert R. VanNimwegen and Samuel Tepper *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 477-484 (For availability see N72-32867 23-32)
CSCL 21E

16 MASERS

Includes applications of masers and lasers. For basic research see: 26 Physics, Solid State.

N72-32515*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CIRCULAR PIEZOELECTRIC BENDER LASER TUNERS
J. H. McElroy, P. E. Thompson, H. E. Walker, E. H. Johnson, D. J. Radecki (GTE Sylvania, Inc.), and R. S. Reynolds (GTE Sylvania, Inc.) Sep. 1972 41 p refs Submitted for publication
(NASA-TM-X-66040; X-524-72-343) Avail: NTIS HC $4.25
CSCL 20E

The circular piezoelectric bender laser tuner to replace conventional laser tuners when mirror diameters up to 0.50 inch are sufficient is described. The circular piezoelectric bender laser tuner offers much higher displacements per applied volt and permits laser control circuits to be fabricated using standard operational amplifiers, rather than the expensive high-voltage amplifiers required by conventional tuners. The cost of the device is more than one order of magnitude lower than conventional tuners and the device is very rugged with all mechanical resonances easily designed to be greater than 3kHz. In addition to its use as a laser frequency tuner, the circular bender tuner should find many applications in interferometers and similar devices. Author

N72-32516# Joint Publications Research Service, Arlington, Va.
SAFETY TECHNIQUE DURING WORK WITH LASERS, ESTABLISHMENT OF LASER LABORATORIES, OPERATING ROOMS USING LASERS
N. F. Gamaleya 15 Sep. 1972 16 p Transl. into ENGLISH from the book "Lazery v Eksperimente i Klinike" Moscow, Izd-vo Meditsina, 1972 p 36-47
(JPRS-57029) Avail: NTIS

The effects of laser radiation on organs and tissues of humans during biomedical experiments are discussed. Safety techniques of Soviet, French, and U.S. laboratories are described. Author

N72-32517# Department of Supply, Melbourne (Australia).
THE APPLICATION OF A HELIUM-NEON LASER TO THE MEASUREMENT OF SURFACE DISPLACEMENT, SURFACE VIBRATION, AND RANDOM SURFACE MOTION
T. J. Struys Jan. 1971 43 p refs
(ARL/Inst-76) Avail: NTIS HC $4.25

Applications of helium-neon lasers to holographic interferometry for vibration mode measurement and nondestructive surface control are discussed. The direct recording of velocity and displacement of a surface with respect to a reference point is described. The physical phenomena are explained with reference to communication and electrical engineering principles. Theoretical results of the experiments are presented. Author

N72-32518*# Kanner (Leo) Associates, Redwood City, Calif.
LASERS AND THERMONUCLEAR FUSION
S. Witkowski Washington NASA Feb. 1972 18 p Transl. into ENGLISH from Naturwissenschaften (West Germany), no. 57, 1970 p 211-215
(NASA Order A-64460-A)
(NASA-TT-F-14465) Avail: NTIS HC $3.00 CSCL 20E

The production of plasmas by laser spark is discussed along with the irradiation of solids for the production of high temperatures for thermonuclear fusion. Experimental studies of the irradiation of solids including solid deuterium, LiH, LiD are reviewed, and a unidimensional planar gas-dynamics model was developed to study the phases of plasma production. It is concluded that the use of lasers for initiating hydrogen bombs will not be achieved in the foreseeable future. F.O.S.

N72-32519*# National Aeronautics and Space Administration, Washington, D.C.
SENSITIVITY OF THE LASER EMISSION SPECTROGRAPHY METHOD IN THE ANALYSIS OF NONCONDUCTIVE POWDER SAMPLES
Tsuneko Yamane and Sumeo Matsushita Jun. 1972 6 p refs Transl. into ENGLISH from Bunseki Kagaku (Tokyo), v. 20, no. 9, 1971 p 1202-1204
(NASA-TT-F-14478) Avail: NTIS HC $3.00 CSCL 20E

The sensitivity of detection of nonconductive powder samples in laser emission spectrography is considered. After powder samples were mixed with phenol resin and heat-cured, they were excited by a two-stage method combining laser light, obtained by normal pulse oscillation with spark discharge, using a carbon auxiliary electrode. Author

N72-32520*# Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF THE PHYSICAL STATE OF BREAKDOWN PRODUCTS BY LASER ACTION ON CONDENSED MEDIA
M. A. Yel'yashevich, V. K. Goncharov, L. Ya. Minko, and G. S. Romanov Washington NASA Mar. 1972 8 p refs Transl. into ENGLISH from Zh. Prikl. Spectrosk. (Minsk), v. 15, no. 2, Aug. 1971 p 200-204 presented at 3d All-Union Thermodyn. Conf. on properties of Substances at high Temps., Baku, Oct. 1968 Sponsored by NASA
(NASA-TT-F-14476) Avail: NTIS HC $3.00 CSCL 20E

The kinetics of processes leading to the formation of plasma and of the plasma stream during the laser action on metals was studied. To study a structure and a mechanism of the formation and the effect of processes proceeding in the stream on the kinetics of material breakdown, their continuous photoregistration was carried out. A close similarity in the physical state of the plasma streams formed during the laser action on metals and of crosional plasma streams during strong impulse discharge was found. The excited spectra were of a thermal nature. Uniform spectra and large broadening of discrete spectral lines were observed. Author

N72-32521# Los Alamos Scientific Lab., N.Mex. Advanced Concepts Group.
CENTRAL STATION POWER GENERATION BY LASER-DRIVEN FUSION
L. A. Booth, comp. Feb. 1972 62 p
(Contract W-7405-eng-36)
(LA-4858-Vol-1) Avail: NTIS

The feasibility of using laser-driven fusion pulses for the commercial generation of electric power was investigated. Results are presented in two volumes. Volume I (LA-4858-MS, Uncl.) discusses the general aspects of electric power plants based on laser-driven fusion energy sources, outlines the considerations that led to the wetted-wall concept on which the present study is based, presents detailed results of calculations that indicate the feasibility of the concept, discusses aspects of important areas that are not well defined, summarizes related needs for further study, and compares the concept with plants based on magnetically confined controlled thermonuclear reactions. Volume II(LA-4859-MS, Classified, SRD) outlines LASL's laser program, discusses the problems of achieving laser-driven fusion, considers subsequent neutronic interactions, and gives some economic implications. Author (NSA)

N72-32522# Institut fuer Plasmaphysik G.m.b.H., Garching (West Germany).
INCREASE OF CHEMICAL LASER EFFICIENCY BY

GASDYNAMICAL PUMPING
B. Ahlborn and K. L. Kompa Jan. 1971 30 p refs
(IPP-IV-10) Avail: AEC Depository Libraries

The exhaust of chemical lasers could be used as a source of working fluid and energy for a gasdynamical expansion laser. Molecules such as HF may yield partial vibrational inversions of Delta N/n approximately 0.001 for nozzles with small throat area and large divergence angle. The maximum inversions are calculated and plotted for the P branch lines with rotational quantum numbers J = (1) - (10) of the molecules HF, CH, OH, OD, HC1, CN, CO, NO as functions of the vibrational and rotational temperature. The application of these calculations to the flow through Laval nozzles is illustrated with examples. Additional benefit of this scheme is drawn from the fact that the waste molecules of the chemical laser may have an elevated vibrational temperature, so that the inversion in the flow may be produced and improved by combined chemical and gasdynamical pumping. Author

N72-32523# Commissariat a l'Energie Atomique, Limeil-Brevannes (France). Centre d'Etudes.
PULSED NEUTRON SOURCE USING A LASER BEAM
Maxime Rabeau Jan. 1972 93 p refs In FRENCH
(CEA-R-4273) Avail: AEC Depository Libraries

The large number of ions produced when a Q-switched laser beam is focused onto a target was used as the ion source of a pulsed neutron generator. Puffs of 10 to the 7th power neutrons in 400 nsec were obtained by irradiating a deuterium-based cathode with the deuterons extracted from a deuterium-based T sub i target. The experimental apparatus, the principles underlying the operation of the source, the diagnostic methods, and a simple mathematical model which gives a correct account of the experimental results are described.
Author (NSA)

N72-32524# Sandia Labs., Albuquerque, N.Mex.
HOLOGRAPHY IN A MODERN LABORATORY
Carl G. Murphy and Murphy J. Landry Apr. 1972 26 p refs Presented at 6th Instr. Soc. of Am. Symp., Albuquerque, N. Mex., 24 Apr. 1972 Sponsored by AEC
(SC-DC-721230; Conf-720422-1) Avail: NTIS

The various facets of holography as applied to modern laboratory procedures are discussed. Special attention is given to nondestructive testing, holographic data reduction and display, displacement measuring, display graphics, and pulsed laser development for holography. Author

N72-32525# Quantronix Corp., Smithtown, N.Y.
CW YAG LASER TECHNIQUES Final Report, 15 Jul. 1970 - 15 Jul. 1971
Alexander Stein May 1972 112 p refs
(Contract DAAB07-70-C-0312)
(AD-743979; ECOM-0312-F) Avail: NTIS CSCL 20/5

A Nd YAG laser has been built which provided self compensation of thermally induced stress birefringence and yielded a power output of 27 watts in the TEM(00) mode. To improve the compensation, compact structures involving cemented and sleeved assemblies were fabricated and tested. The limitations of the present compensation technique are discussed and design changes for improved performance are proposed. The performance of compensated Nd YAG lasers was compared with that of Nd YA103 systems. Finally, an analysis of the use of the compensated laser as a pump for nonlinear optical processes is presented. Author (GRA)

N72-32526# General Dynamics Corp., San Diego, Calif. Electro Dynamic Div.
MICROWAVE HOLOGRAPHY FOR RADOME ANALYSIS Final Report, Jan. 1971 - Mar. 1972
E. L. Rope, R. A. Hayward, and G. Tricoles Mar. 1972 82 p refs
(Contracts N00019-71-C-0065; N00019-70-C-073)
(AD-744072; R-71-016-4) Avail: NTIS CSCL 14/2

The report describes work toward the development of microwave holography as a diagnostic method for radomes, antennas, and wave propagation. Author (GRA)

N72-32527# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
OPTICAL FILTER FUNCTION FOR A FOLDED LASER PATH Research and Development Technical Report
Jack Smith (Tex. Univ., El Paso), Thomas H. Pries, Kenneth J. Skipka, and Marvin A. Hamiter Apr. 1972 31 p refs
(DA Proj. 1T0-61102-B-53-A)
(AD-743850; ECOM-5433) Avail: NTIS CSCL 20/5

Expressions have been developed for the variance of amplitude and phase of an optical signal propagating over a folded path. A comparison of folded- and straight-path scintillation characteristics indicates that the folded-path scintillations are heavily weighted by larger turbulent scale sizes, and the straight-path scintillations are determined by smaller turbulent sizes. The effects of turbulent scale sizes located at various distances from the laser are examined for both folded and straight paths. Experimental results are presented showing good agreement with the theoretical development. Author (GRA)

N72-32528# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SIDELIGHT SPECTROSCOPY OF A CARBON DIOXIDE LASER AMPLIFIER M.S. Thesis
David Arthur LaBorde Jun. 1972 95 p refs
(AD-743567; GEP/PH/72-10) Avail: NTIS CSCL 20/5

A method for determining the vibrational energy distribution of nitrogen molecules in the electronic ground state in a carbon dioxide-nitrogen-helium laser amplifier was evaluated. This method relates the relative population of the C triplet pi(u) electronic state to the relative population of the ground state of nitrogen. The relative population of the C triplet pi(u) electronic state was determined by measuring the relative intensities of the electron-vibrational bands of the second positive system of nitrogen. These measurements were conducted as the laser amplifier parameters, discharge current, total pressure, carbon dioxide concentration, and input power, were varied. It was found that the relative population of the C triplet pi(u) state was insensitive to changes in the laser amplifier parameters over a range significant to its operation. Measurements of spontaneous emission from the upper laser level of carbon of carbon dioxide were conducted. Author (GRA)

N72-32529# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PHOTOLUMINESCENCE STUDIES OF GERMANIUM USING A NEODYMIUM LASER M.S. Thesis
Steven B. Humbert Jun. 1972 96 p refs
(AD-743566; GNE/PH/72-7) Avail: NTIS CSCL 20/12

Irradiated and non-irradiated germanium samples were studied at liquid He temperatures with the technique of photoluminescence produced by a commercial NdYAG laser. In a continuous mode, the laser was used with conventional lock-in amplifier techniques to obtain luminescence intensity vs energy spectra and in a pulsed mode the laser was used with a boxcar integrator to obtain both energy spectra and recombination lifetime data. Intrinsic band-to-band spectra were studied with the laser in either the continuous or pulsed modes while extrinsic radiation defect spectra could not be observed in the pulsed mode. Continuous laser excitation produced intrinsic band gap and extrinsic defect spectra that were identical to previous results using a high intensity tungsten lamp as the excitation source. Author (GRA)

N72-32530# Atmospheric Sciences Office, White Sands Missile Range, N.Mex.
APPLICATION OF DUAL PARAMETER ANALYZERS IN SOLID-STATE LASER TESTS

Stuart A. Schleusener (N. Mex. Univ.) and Kenneth O. White Apr. 1972 24 p refs
(DA Proj. 1T0-61102-B-53-A)
(AD-743459; ECOM-5432) Avail: NTIS CSCL 20/5

New applications of a 128 by 128 channel, computer-controlled, dual parameter analyzer used to record, compute, and display solid-state laser emission and propagation data are described. The pulse-height-analysis coincidence mode is used to make spike amplitude measurements on reference and propagated signals or make spike coincidence measurements on two spectrometer output signals. An X-Y contour mode display provides a real-time visual indication of results for wavelength-dependent absorption tests, cavity mode tests, and beam cross-section studies. A description of an operating system and initial test results are presented. Author (GRA)

N72-32531# Aerospace Corp., El Segundo, Calif.
CHEMICAL LASER NOZZLE FLOW DIAGNOSTICS Technical Report, Oct. 1970 - May 1971
Robert L. Varwig 15 Feb. 1972 48 p refs
(Contract F04701-71-C-0172)
(AD-743999; TR-0172(2779)-1; SAMSO-TR-72-81) Avail: NTIS CSCL 20/5

Diagnostic techniques, including schlieren, chemiluminescent photography, pitot pressure, and total temperature probes, have been evaluated and applied to the problem of determining the flow properties in the laser cavity of a supersonic diffusion laser system. For the present schlieren system, the plenum pressure and temperature requirements are indicated. It is shown that chemiluminescent photography can provide shock pattern details in air-like gases for plenum temperatures of the order of 2000 K at pressures of about 1 atm. Seeding with gases can also provide information. Pitot pressure probes make possible the detection and tracking of shock waves and can, therefore, be used to determine if exit pressure and ambient pressure are matched. The measured total temperature and pitot pressure profiles were compared with theoretical predictions based on boundary layer growth. Author (GRA)

N72-32532# ILC, Inc., Sunnyvale, Calif.
OPTICAL PUMPS FOR ERBIUM LASERS Final Report, 1 Jul. 1970 - 1 Aug. 1971
Lowell Noble and Leonard Reed Oct. 1971 205 p refs
(Contract DAAB07-70-C-0296; DA Proj. 1S6-62705-A-055)
(AD-744480; ECOM-0296-F) Avail: NTIS CSCL 20/5

The purpose of this program was to produce more efficient plasma pumps for pulsed Er YAG and Er glass lasers. A 4mm bore, 700 Torr xenon lamp, for use with a clad erbium silicate glass laser material has been developed for 1.54 micrometers eye safe range finders and target designators. The desired normal mode output of 50 mj was achieved, at 0.031% efficiency, using a 160 J, 1.5 msec pulse delivered at 5 pps from a 4-section PFN. An intersecting circle cavity design, and a 3 inch length, 0.25 inch diameter clad laser rod with 0.157 inch silicate glass core was used. Author (GRA)

N72-32533# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
A STUDY OF THE PARAMETERS ASSOCIATED WITH EMPLOYING LASER SPECKLE CORRELATION FRINGES TO MEASURE IN-PLANE STRAIN Technical Report, Dec. 1971 - Feb. 1972
Frank D. Adams Mar. 1972 29 p refs
(AD-744489; AFFDL-TR-72-20) Avail: NTIS CSCL 14/2

Basic experimental parameters associated with using laser speckle correlation fringes to measure in-plane strain have been investigated. Equations and inequalities are derived which provide bounding numbers for many of the physical parameters. The feasibility of employing this technique for obtaining in-plane ytrain data in a microscopic region is shown. This suggests that it may be applicable for studying strain distributions in the vicinity of either a crack or an interference fit fastener.
Author (GRA)

N72-32534# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
LASER DAMAGE STUDY WITH SUBNANOSECOND PULSES Technical Report, 8 Apr. 1969 - 31 Dec. 1971
E. S. Bliss 31 Mar. 1972 31 p refs
(ARPA Order 1434)
(AD-744075; AFCRL-72-0233; AFCRL-PSRP-488; TR-1) Avail: NTIS CSCL 14/2

The report describes a ruby laser test facility for conducting laser-induced damage experiments with single subnanosecond pulses. The facility includes a laser damage monitoring system and a mode-locked oscillator-amplifier system with pulse selection. Author (GRA)

N72-32535# Princeton Univ., N.J.
EFFECTS OF TURBULENCE INSTABILITIES ON LASER PROPAGATION Quarterly Progress Report, 9 Dec. 1971 - 8 Mar. 1972
David A. DeWolf Griffiss AFB, N. Y. RADC Apr. 1972 38 p refs
(Contract F30602-71-C-0356; ARPA Order 1279)
(AD-744099; PRRL-72-CR-12; RADC-TR-72-119; QPR-3) Avail: NTIS CSCL 20/6

Several statistics of the focal spot of a focussed laser beam in turbulent air are computed. The average area is recomputed for horizontal propagation, and corrected graphs are presented. Comparison to the half-power area is made, and it is concluded that the irradiance-weighted radius variance is a slightly better criterion, although the differences are small. The calculations are extended to slant paths. The power spectrum of the area scintillation is shown to be proportional to that of angle of arrival of a ray. It is computed for frozen flow and for random flow with zero mean velocity. Both spectra are initially flat, then decay as f to the minus 2/3 power. A composite formula is suggested for the general case. Author (GRA)

N72-32536# Johns Hopkins Univ., Baltimore, Md. Dept. of Physics.
LASER LIGHT SCATTERING STUDIES OF PHASE TRANSITIONS Final Report, 15 Jul. 1965 - 30 Dec. 1971
Herman Z. Cummins 1 May 1972 11 p refs
(Contract DA-31-124-ARO(D)-400)
(AD-744532; AROD-5415-19-P) Avail: NTIS CSCL 07/4

Very briefly described is research in which the dynamics of phase transition phenomena were investigated by means of laser light scattering spectroscopy. Raman, Brillouin and light-beating techniques were used in exploring the following phenomena: The liquid-vapor critical point in carbon dioxide; The ferroelectric transition in triglycine sulfate (TGS); The alpha-beta structural transition in quartz; The ferroelectric transition in potassium dihydrogen phosphate (KDP) and potassium dideuterium phosphate (KD*P); The order-disorder transition in ammonium chloride at high pressure. Author (GRA)

N72-32537# American Optical Co., Southbridge, Mass. Central Research Lab.
NEODYMIUM LASER GLASS IMPROVEMENT PROGRAM Technical Summary Report, 1 Jan. - 30 Jun. 1966
Richard F. Woodcock Nov. 1971 16 p
(Contract Nonr-3835(00); ARPA Order 306; Proj. DEFENDER)
(AD-744225; TR-598-8) Avail: NTIS CSCL 20/5

Efforts during this reporting period were concerned with the determination of the effect of solarization on lasting characteristics of several glass compositions under investigation and a continuation of athermalization studies begun previously. The procedure used in the solarization tests is described; results obtained indicate decreased slope efficiencies and increased threshold values are uncorrelated with solarization. Based on encouraging results obtained from measurements of the change in optical pathlength on a modified athermal glass composition, a second series of 16 athermal glasses was prepared. Finally, efforts to finalize the procedure for measuring stress-optical coefficents are described. Author (GRA)

17 MATERIALS, METALLIC

Includes cermets; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see: 06 Chemistry. For related information see also: 18 Materials, Nonmetallic; and 32 Structural Mechanics.

N72-32538 National Lending Library for Science and Technology, Boston Spa (England).
A RADIOGRAPHIC INVESTIGATION OF THE STRUCTURAL CHANGES ON ELECTRODES UNDER THE ACTION OF SINGLE IMPULSE DISCHARGES
K. K. Namitokov, D. P. Solopikhin, and I. Ya. Surovtsev Jul. 1972 10 p refs Transl. into ENGLISH from Fiz. Khimiya Obrabotki Mater. (USSR), v. 6, 1971 p 11-16
(NLL-RTS-7269) Avail: Natl. Lending Library, Boston Spa, Engl.: £1.00; 3 NLL photocopy coupons

An X-ray study was made of the structural changes on electrodes of annealed and deformed nickel and a compacted mechanical mixture of copper and nickel powders which are subjected to a single spark discharge. Different effects of the temperature gradient on structural variation of the electrode material are established. An X-ray camera design for selective radiography is also described. Author

N72-32539# Aeronautical Research Labs., Melbourne (Australia).
DEMONSTRATING X RAY DIFFRACTION
R. A. Coyle and B. E. Williams Nov. 1971 22 p
(ARL/Met-78) Avail: NTIS HC $3.25

A number of models are detailed which introduce the concepts of X-ray diffraction to nonspecialists. The models illustrate: diffraction of light, interference of waves, Bragg's law and diffraction from single crystals, and the formation of X-ray powder patterns. Author

N72-32540# Lockheed Missiles and Space Co., Palo Alto, Calif.
KINETICS OF METAL EVAPORATION. SURFACE TEMPERATURE
S. I. Anisimov, Ia. A. Imas, G. S. Romanov, and Iu. V. Khodyko 1972 15 p refs Transl. into ENGLISH from the book "Deistvie Izlucheniia Bolshoi Moshchnosti na Metally" Moscow, Nauka, 1970 p 97-103
Avail: NTIS HC $3.00, National Translations Center, John Crerar Library, Chicago, Ill. 60616

Data, covering the temperature dependence of the rate of evaporation in metal surfaces, are presented. The effects of surface temperature and flux density on evaporation are included. E.H.W.

N72-32541*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METAL-METAL LAMINAR COMPOSITES FOR HIGH TEMPERATURE APPLICATIONS
C. A. Hoffman and J. W. Weeton 1972 42 p refs Presented at 4th Ann. Spring Meeting of the Metallurgical Soc. of ASME, Boston, 8-11 May 1972
(NASA-TM-X-68056; E-6907) Avail: NTIS HC $4.25 CSCL 11F

A study was conducted to obtain indications of the potentialities of laminar metal-metal composites for elevated temperature use. Most of the composites consisted of multiple layers or laminae of tungsten alternated with laminae of Nichrome V, a ductile, weaker but oxidation-resistant alloy. Composites with 50 volume percent of each phase were tested in tension and stress rupture at temperatures of 871 and 1093 C (1600 and 2000 F) and in impact at 23 and 524 C (73 and 975 F). A tension and a short time stress-rupture test was conducted on specimens of 77 v/o W-Re-Hf-C/23 v/o Inconel alloy 600 at 1093 C (2000 F). Author

N72-32542*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACCESS TO UNCOMBINED TITANIUM THROUGH AN INHIBITING FILM IN SUBLIMATION PUMPING OF DEUTERIUM
Robert Steinberg and Donald L. Alger 1972 17 p refs Presented at the 19th Natl. Vacuum Symp. of the Am. Vacuum Soc., Chicago, 2-5 Oct. 1972
(NASA-TM-X-68119; E-7072) Avail: NTIS HC $3.00 CSCL 11F

It was demonstrated, through a series of experiments, that it is possible (by the addition of a thin layer of titanium to an apparently occluded surface) to gain access to previously deposited sublayers of uncombined titanium in spite of the presence of an inhibiting film (such as an oxide) on the surface. Author

N72-32543# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC THICKNESS MEASUREMENT OF DAMAGED ZONE IN 024 INCH FORGED STEEL TUBE
L. X. Nepomuceno 29 May 1972 6 p In PORTUGUESE; ENGLISH summary
(TR-7205.585) Avail: NTIS HC $3.00

The ultrasonic inspection results to determine the minimum thickness for damaged areas of forged 24 inch diameter steel pipes are reported. The procedures are described, and photographs of the echograms are included. It was found that the thickness varied from 35 mm to 35.7 mm point to point along the length of the pipe. Transl. by F.O.S.

N72-32544# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION AND CONTROL OF THE WELDMENTS IN TWO CAST STEEL CYLINDERS
L. X. Nepomuceno and M. F. Barbosa 23 Jun. 1972 6 p In PORTUGUESE; ENGLISH summary
(TR-7206.588) Avail: NTIS HC $3.00

The results are reported of ultrasonic inspection of weldments on steel cylinders. Photographs of the echograms showing the defects are included along with drawings indicating the defect locations. Transl. by F.O.S.

N72-32545# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION AND CONTROL OF THE WELDMENTS IN CAST STEEL CYLINDER
L. X. Nepomuceno and M. F. Barbosa 20 Jun. 1972 4 p In PORTUGUESE; ENGLISH summary
(TR-7206.587) Avail: NTIS HC $3.00

The results are presented of ultrasonic inspection of weldments in a cast iron cylinder. The positions of various defects are shown. Transl. by F.O.S.

N72-32546# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC THICKNESS MEASUREMENT AND CORROSION CONTROL IN CAST IRON PANEL USED IN PHENOL CRACKING
L. X. Nepomuceno 12 Jun. 1972 5 p In PORTUGUESE; ENGLISH summary
(TR-7206.586) Avail: NTIS HC $3.00

The inspected iron panel, the equipment, acessories and procedure for thickness measurements are reported. The results are presented in numerical form, with positions of the measured spots indicated. Author

N72-32547*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HODOGRAPHIC APPROACH TO PREDICTING INELASTIC STRAIN AT HIGH TEMPERATURE

Avraham Berkovits Washington Sep. 1972 35 p refs
(NASA-TN-D-6937; E-6933) Avail: NTIS HC $3.00 CSCL 11F

An experimental study of the effect of continuous and discontinuous changes in strain rate on the relationship among strain rate, strain, and stress is described. Data from Udimet 700 in tension at 925 C were used in order to relate cyclic tensile creep to the monotonic properties of the material by means of the hodograph. The nature of modifications caused to the hodograph by discontinuous variation of the strain rate was determined from tests. Reloading at discontinuous strain rate caused reactivation of primary creep. A simple method, based on monotonic material properties, is proposed for predicting cyclic tensile creep response. Preliminary results of cyclic tests agree with predicted response. Author

N72-32548# National Materials Advisory Board, Washington, D.C. Div. of Engineering.
PROCESSES FOR RUTILE SUBSTITUTES
Jun. 1972 200 p refs
(Contract GS-OO-DS-(P)-94008)
(NMAB-293) Avail: NTIS HC $12.00

A study was made to determine whether domestic resources of titanium minerals, other than rutile, occur in sufficient quantity to furnish the required starting materials for demands for titanium metal production, and whether economical processes exist or could be developed to treat these domestic ores to produce quality sponge. A number of processes use ilmenite to produce a material that is high in TiO2, is free of most contaminating elements, such as iron and magnesium, and has many of the physical characteristics of rutile. This rutile substitute can be chlorinated successfully to yield TiCl4 which can be reduced to titanium sponge. The choice of a specific process is influenced by the particular raw material used and by environmental considerations. Ilmenite is also being chlorinated directly in a commercial process without an intervening upgrading step, and the resulting TiCl4 can be purified to the quality needed for metal sponge production. In an emergency, available processes would not be economically prohibitive, and the production of rutile substitutes, comparable to rutile in quality, is governed by existing competitive market economics. Author

N72-32549*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF AGING AT 1040 C (1900 F) ON THE DUCTILITY AND STRUCTURE OF A TANTALUM ALLOY, T-111
Gordon K. Watson and Joseph R. Stephens Washington Oct. 1972 36 p refs
(NASA-TN-D-6988; E-6988) Avail: NTIS HC $3.00 CSCL 11F

The post-aging embrittlement of T-111 (tantalum - 8-percent tungsten - 2-percent hafnium) following exposure for up to about 10,000 hours at 1040 C in either vacuum or liquid lithium was investigated for sheet and tubing samples. This thermal aging was shown to greatly increase the sensitivity of T-111 to hydrogen embrittlement during subsequent room temperature specimen processing or testing. The hydrogen embrittlement problem can be avoided by preventing exposure to the T-111 to moisture during post-aging processing or testing. Aging at 1040 C also resulted in formation of HfO2 particles at grain boundaries, which may contribute to the observed embrittlement. Author

N72-32550*# Kanner (Leo) Associates, Redwood City, Calif.
ON THE SHAPE OF ULTRAMICROSCOPIC GOLD PARTICLES
R. Gans Washington NASA Jun. 1972 22 p refs Transl. into ENGLISH from Ann. Physik (Leipzig), v. 37, 1912 p 881-900 Sponsored by NASA
(NASA-TT-F-14477) Avail: NTIS HC $3.25 CSCL 11F

The color appearances of metals in the colloidal state are clarified by a theoretical study. It is shown that the optical constants of the metal concerned and the particle size are the color determining factors, and that a resonance phenomenon is not correct. The absorption curves for colloidal gold solutions are calculated, with the assumption that the particles are spheres whose refractive index and absorption coefficients possessed the same values, for individual wavelengths, as those for metallic gold. The result is that very small gold particles give ruby-red solutions and, that with increasing particle size, the solutions take on deeper blue colors. Author

N72-32551# Joint Publications Research Service, Arlington, Va.
USE OF MAGNESIOTHERMY FOR REDUCTION OF VARIOUS METALS AND ALLOYS
G. V. Samsonov and V. P. Perminov 29 Sep. 1972 82 p refs Transl. into ENGLISH of the book "Magniyetermiya" Moscow, Metallurgiya Publishing House, 1971 174 p
(JPRS-57138) Avail: NTIS HC $6.25

The theoretical bases of magnesiothermic reduction of metals and alloys are analyzed. Author

N72-32552# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
CREEP BEHAVIOR AND TIME TO RUPTURE OF THE ALLOY X8CrNiMoNb b 1616 FOR VARIOUS PRETREATMENTS
H. Boehm, M. Schirra, R. Solano (Junta de Energia Nucl.), and R. Garcia (Junta de Energia Nucl.) Dec. 1971 75 p refs In GERMAN
(KFK-1512) Avail: AEC Depository Libraries

In order to study the influence of different thermomechanical treatments on the creep behavior and time-to-rupture of stainless steel X8 CrNiMoNb 1616 (DIN 1.4981) samples of five different pretreatments were investigated in the temperature range 600 to 800 C. Starting with solution treated material it was found that annealing at 700 and 800 C (Treatment 2 and 3) did not materially affect time-to-rupture. On the other hand time-to-rupture and creep behavior were greatly improved by 12% cold-work (Treatment 4) and by cold-work and annealing at 800 C (Treatment 5). The loss of ductility was relatively small. The main effect of treatments IV and V was strengthening of the matrix via coldwork, i.e., the yield point at high temperature was raised. This is an important point to consider for designing fuel element cladding. The most important creep data for pretreatments I to V are given for all tests temperatures and a wide range of stresses. Author (NSA)

N72-32553# Iowa State Univ. of Science and Technology, Ames.
MECHANICAL PROPERTIES AND DEFECTS IN REFRACTORY METALS
Monroe S. Wechsler [1972] 46 p refs Presented at the Intern. Conf. on Defects in Refractory Metals, Mol, Belgium, 20-22 Sep. 1971 Sponsored by AEC
(IS-2773; CONF-710905-5) Avail: NTIS

The temperature dependence of yielding and flow in the body-centered cubic (bcc) metals is discussed. The controversy between intrinsic and extrinsic mechanisms for the low temperature strength of bcc metals is reviewed, with particular emphasis on the phenomenon of alloy softening. The experimental evidence for alloy softening in niobium and tantalum alloys is described. Two intrinsic mechanisms (double kink nucleation and sessile-glissile transformations) and one extrinsic mechanism (interstitial impurity hardening) are discussed. Experimental results are cited illustrating the influence of interstitial impurities on the temperature dependence of the yield stress. Author (NSA)

N72-32554# Sandia Labs., Albuquerque, N.Mex. Materials and Metallurgy Dept.
INFLUENCE OF MICROSTRUCTURE ON LOW TEMPERATURE CREEP OF Ti-5 Al-2.5 Sn
Anthony W. Thompson and Ben C. Odegard Mar. 1972 42 p refs
(Contract at(29-1)-789)
(SCL-RR-720227) Avail: NTIS

Creep tests were performed on normal grade Ti-5 Al-2.5 Sn

at 194, 299, 339 and 422 K. Three processing histories were studied: bar stock, and forgings made in the alpha and beta ranges. Creep stresses ranged from 40 to 90% of the 299 K tensile yield stress. At 60 and 80% tensile yield stress, the forged materials were more creep resistant than the bar stock, while at 90% tensile yield stress all three materials were alike. The apparent activation energy for creep, about 2150 J/mol, was about one-fourth the energy for self-diffusion. Observations on thin foils showed that the bar stock and alpha-forged material had equiaxed grain structures, while the beta-forged material consisted of massive martensite alpha plates. Films of retained beta appeared to be present in many alpha boundaries; this restricted slip to individual alpha plates. A microstructural rationale was constructed, suggesting that each material contained dislocation sources which differed in ease of operation. The beta-forged material was fitted into this rationale by the observation that dislocations in beta boundaries could apparently avt as sources. Author

N72-32555# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
EFFECT OF NEUTRON IRRADIATION ON THE DUCTILITY OF AUSTENITIC STAINLESS STEEL
E. E. Bloom and J. R. Weir, Jr. [1971] 25 p refs Presented at Conf. on Reactor Mater. Performance, Richland, Wash., 24 Apr. 1972 Sponsored by AEC
(Conf-720420-4) Avail: NTIS

The effects of fast neutron irradiation on the tensile and creep-rupture ductility of austenitic stainless steels are presented. At low temperatures, below 450 C, radiation causes a reduction in the strain hardening exponent and thus the uniform strain. At high temperatures (above 750 C) reduced ductility results from helium embrittlement. At intermediate temperatures, hardening and helium effects act synergistically to produce lower ductility than would result from either effect alone. Possible mechanisms responsible for the observed changes are discussed.
Author (NSA)

N72-32556# Tennessee Univ., Knoxville. Dept. of Chemical and Metallurgical Engineering.
MICROSTRUCTURAL STABILITY OF THERMAL-MECHANICALLY TREATED AUSTENITIC STAINLESS STEELS Progress Report, 1 Feb. 1971 - 31 Jan. 1972
Joseph E. Spruiell 31 Jan. 1972 65 p refs
(Contract AT(40-1)-4044)
(ORO-4044-2) Avail: NTIS

Studies of the microstructural stability of three austenitic stainless steels are being performed for a wide range of thermal-mechanical pretreatments in the limited aging temperature range of 550 to 750 C. The steels studied include Types 316, 304, and a Ti modified version of Type 316. The pretreatments were selected in order to investigate the effects of varying solution treatment temperature, amount of cold reduction by rolling, initial grain size, and initial precipitate distribution. Both the phase stability and the recovery and recrystallization behavior of cold worked materials are investigated. Results show that large variations in both phase stability and recrystallization behavior can be effected by appropriate pretreatments. Cold work accelerates precipitation of M23C6 carbide and the intermetallic compounds. Author (NSA)

N72-32557# General Motors Technical Center, Warren, Mich. Materials and Structures Lab.
MEASUREMENTS OF DYNAMIC PROPERTIES OF MATERIALS. VOLUME 6: TANTALUM Final Report
William M. Isbell, Douglas R. Christman, and Stephen G. Babcock Feb. 1972 84 p refs
(Contract DASA01-68-C-0114)
(AD-741217; MSL-70-23-Vol-6; DASA-2501-6) Avail: NTIS CSCL 11/6

Results of an experimental study on the dynamic properties of tantalum are presented. Areas studied included stress-strain-strain rate and reverse loading behavior, elastic constants, equation of state, compressive and release wave characteristics, and spall fracture. Author (GRA)

N72-32558# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION TO ESTABLISH THE COMPARATIVE WEAR RESISTANCE OF VARIOUS METALS TO METALS WITH MELTED POLYAMIDE COATINGS
Emil Vadasz 20 Jul. 1971 34 p refs Transl. into ENGLISH from Gepgyartastechnologia (Budapest), vol. 10, no. 7, 1970 p 317-325
(AF Proj. 7343)
(AD-743825; FTD-HC-23-288-71) Avail: NTIS CSCL 11/6

The paper deals in detail with the wear resistance of various metals tested under similar conditions, e.g., cast iron, steel, nonferrous metals, and publishes comparative data. The test results are being better demonstrated by means of photographs taken of the surface of the material subjected to the abrasive test and by means of torque change diagrams. The examination contains comparative data of metals, cloth base phenol and melted on polyamide coating machined to different surface roughness. GRA

N72-32559# Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
DETERMINATION OF THERMOPHYSICAL PROPERTIES AT HIGH TEMPERATURES BY DIRECT HEATING METHODS Annual Progress Report, 1 Nov. 1970 - 30 Nov. 1971
Raymond E. Taylor Feb. 1972 69 p refs
(Contract F33615-71-C-1183; AF Proj. 7381)
(AD-743976; AFML-TR-72-9) Avail: NTIS CSCL 11/6

Thermophysical property data for arc cast tungsten and for MOD-3 carbon to about 2600 K are given. These properties include the electrical resistivity, hemispherical total emittance, normal spectral emittance, and thermal conductivity for both materials. Lorenz function for tungsten and thermal linear expansion for MOD-3 carbon. Some data on Thornel 50 and Morganite II fiber are also presented. A brief analysis of digital data acquisition systems for the laboratory and a description of the system purchased by TPRC are included. Author (GRA)

N72-32560# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FORMATION OF NITROUS AUSTENITE DURING DIFFUSION SATURATION OF STEEL KhA
A. V. Belotskii, V. G. Permyakov, and I. M. Samsonyuk 21 Mar. 1972 9 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Chernaya Met. (Moscow), no. 10, 1969 p 86-88
(AD-744151; FTD-HC-23-147-72) Avail: NTIS CSCL 13/8

Nitride austenite produced during nitriding of 38 KhA steel is heterogeneous in composition. In the nitriding temperature interval studied (750-1050 C), there are two isostructural solid solutions, one of which is a solid solution of carbon, the other being a solid solution of nitrogen in the face-sintered cubic lattice of the matrix. The maximum saturation of austenite by nitrogen is achieved at 900 C. A homogeneous nitride-carbide austenite is formed in the nitriding modes used only in the 1000-1050 C interval. The coefficient of diffusion of nitrogen in the austenite of type 38 KhA steel was approximately determined. Author (GRA)

N72-32561# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TEMPERATURE DEPENDENCES OF THE VISCOSITY OF METALS
M. P. Bogdanovich and B. A. Baum 13 Mar. 1972 10 p refs Transl. into ENGLISH from Tr. Uralsk. Politekhn. Inst. (Sverlovsk), no. 167, 1968 p 96-98
(AD-744153; FTD-HT-23-1099-71) Avail: NTIS CSCL 11/6

For pure metals three types of given dependences are

observed: (1) the polytherm has its convex side facing the abscissa, which is probably explained by the weakening of bonds during the thermal expansion of a fluid: (2) the curve has its concave side to the abscissa, the activation energy increases with a rise in temperature, which can be caused by an increase in the coordination number, the integral bond energy increases, regardless of the possible weakening of a single bond, this can also take place in the case of intensive metallization of primarily covalent bonds; (3) the given linear dependence, the invariability of E with a rise in temperature is probably explained by the compensating effect of several factors. Author (GRA)

N72-32562# General Electric Co., Schenectady, N.Y. Research and Development Center.
SEGREGATION AT GRAIN BOUNDARIES AND SURFACES Final Report, 5 May 1969 - 31 May 1972
Thomas R. Anthony May 1972 16 p
(Contract DAHC04-69-C-0070)
(AD-744519; SRD-72-058; AROD-8156-10-MC) Avail: NTIS CSCL 11/6

The segregation of impurities to grain boundaries generated by vacancy currents in metals was measured and related to the magnitude of vacancy currents occurring during annealing and quenching and to atomic parameters such as the vacancy jump frequency around impurity atoms in an alloy. Vacancy currents were found to cause both enhancement and depletion of alloy constituents at grain boundaries. Author (GRA)

N72-32563# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
VISCOSITY PROPERTIES OF IRON-CARBON MELTS WITH NICKEL AND TUNGSTEN ADDITIVES
D. S. Popov, A. F. Vishkarev, and V. I. Yavoyskii 21 Mar. 1972 10 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Chernaya Met. (Moscow), v. 13, no. 9, 1970 p 52-56
(Contract F33615-71-C-1182)
(AD-744263; FTD-HC-23-95-72) Avail: NTIS CSCL 11/6

Based on X-ray diffraction data for the Fe-C system the viscosity values for these melts were calculated. Ternary alloys Fe-C-Ni (with 5 percent Ni) and Fe-C-W (with 5 percent W), i.e. Fe-C-alloys with additions which behave directly opposite to them during the carbide-formation process, were also investigated. The addition of 1.5-2.0 percent C does not change the viscosity. The addition of 5 percent W results in the formation of stable W carbides and in a change in the degree of superheating of the alloy above the liquids temperature. In the case of Fe-C-5 percent Ni, increased C activity in the presence of Ni is noted. The second characteristic of this system is the strong temperature dependence of the viscosity. The results indicate a change in the short-range order in the Fe-C melts in the presence of both the carbide-forming and graphite-forming elements. Author (GRA)

N72-32564# Michigan Univ., Ann Arbor. Dept. of Materials and Metallurgical Engineering.
PRELIMINARY REPORTS, MEMORANDA AND TECHNICAL NOTES OF THE ARPA MATERIALS SUMMER CONFERENCE, VOLUME 1
Edward E. Hucke 1971 713 p refs Conf. held at Woods Hole, Mass., Jul. 1971 2 Vol.
(Contract DAHC15-71-C-0253; ARPA Proj. 0236)
(AD-744204; Rept-005020-Vol-1) Avail: NTIS CSCL 11/6

The volume contains reports and summaries on topics including: Gradients in polymers; Strain and Fermi energy; Density of amorphous materials; Magnetic suspension and propulsion for high-speed transportation; Defect model for vitreous solids; Thermodynamics of liquid metals; Stress corrosion cracking in plastics; Free energy of inhomogeneous systems; Ionic transport in crystallographic tunnels; Stress of electrochemical dissolution; Amorphous metallic alloys; Diffusion through polymer systems; Montroll's nonlinear wave equation; Packing of spheres; IR windows; Line tension on fracture cracks; Ease of polymeric entanglement; Ground state energy of interacting electrons; Spall fracture; SD effect; Gradient materials; Cracks; Stability of silicon nitride; Levitation in inorganic synthesis; High-temperature properties of Nb and Zr; Pyrolysis of polymers and simple organics; Emissivities of liquid metals; Heats of formation of carbon and graphite; The Li/CFX battery; Stress profiles in composites; Thermodynamics of glassy carbon-graphite; Flow in glasses; Hardness - a strength microprobe. GRA

N72-32565# Michigan Univ., Ann Arbor. Dept. of Materials and Metallurgical Engineering.
PRELIMINARY REPORTS, MEMORANDA AND TECHNICAL NOTES OF THE ARPA MATERIALS SUMMER CONFERENCE. VOLUME 2: ENVIRONMENTAL DEGRADATION OF STRESSED MATERIALS
Edward E. Hucke 1971 317 p refs Conf. held at Woods Hole, Mass., Jul. 1971 2 Vol.
(Contract DAHC15-71-C-0253; ARPA Order 0236)
(AD-744205; Rept-005020-Vol-2) Avail: NTIS CSCL 11/6

The Conference was organized so that fundamental aspects of stress-corrosion cracking were discussed on the first day from a number of different viewpoints. Next, three groups met to consider the possible application of these ideas to the diverse problems of cracking of stainless steel, particularly in nuclear reactors; of the corrosion of high-strength alloys, particularly aluminum and titanium; and of degradation of silicon nitride. The reports comprising the meeting are presented.
Author (GRA)

N72-32566# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
VISCOSITY, DENSITY AND SURFACE ENERGY OF MOLTEN ALLOYS OF IRON AND SILICON
P. V. Geld, P. V. Kocherov, Ye. S. Levin, and B. A. Baum 24 Mar. 1972 11 p refs Transl. into ENGLISH from the publ. "Fiziko-Khimicheskiye Osnovy Prozvodstva Stali" USSR, 1968 p 9-13
(AD-744255; FTD-HC-23-1881-71) Avail: NTIS CSCL 11/6

Investigations of heat and volume effects in mixing, heats of fusion and a number of other characteristics of molten alloys of silicon with fourth period transition metals indicates a high energy of interaction of dissimilar atoms and their severe microheterogeneity. Results of determining viscosity, surface energy and density of Fe- Si alloys are discussed. Kinematic viscosity was calculated according to the decrement of damping of a cylindrical crucible with the melt. Surface energy and density were determined by the large drop method.
Author (GRA)

N72-32567# TRW, Inc., Cleveland, Ohio.
DEVELOPMENT OF ALLOY FOR CAST AIR-COOLED TURBINE BLADES Technical Report, 1 Jul. 1969 - 31 Dec. 1971
H. E. Collins and L. D. Graham Wright-Patterson AFB, Ohio AFML Jan. 1972 129 p refs
(Contract F33615-69-C-1661; AF Proj. 7312)
(AD-744109; ER-7398; AFML-TR-72-28) Avail: NTIS CSCL 11/6

The objective of the program was to develop an alloy and to improve processing for cast air-cooled blades used in high performance gas turbines. The program was divided into three phases. Phase 1 was a screening study where 36 compositions were melted, cast and evaluated on the basis of 1400 F tensile, 1800 F/20 ksi stress rupture and hot corrosion tests. Phase 2 was a concurrent study of the effect of section size and processing variables upon the thin section properties of high temperature alloys. Phase 3 included the characterization of the two most promising alloys from Phase 1 using the processing results from Phase 2. Author (GRA)

N72-32568# California Univ., Los Angeles. School of Engineering and Applied Science.
EMBRITTLEMENT BY LIQUID METALS

M. H. Kamdar Apr. 1972 172 p refs
(Grant DA-ARO(D)-31-124-71-G124)
(AD-744531; UCLA-ENG-7234) Avail: NTIS CSCL 11/6

The paper reviews the results of a number of investigations of liquid metal embrittlement and discusses the prerequisites and possible mechanisms for its occurrence. It also reviews the effects of variables on the severity of embrittlement that normally influence the fracture behavior of a solid. Additionally this paper describes effects on the occurrence and severity of embrittlement caused by the liquid phase. Other topics discussed are the possible correlation between the severity of embrittlement and the electronegativities of the solid and liquid metals, the use of the concept of inert carrier liquid metals and possible means for enhancing or inhibiting embrittlement.

Author (GRA)

8 MATERIALS, NONMETALLIC

Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.

N72-32569# National Bureau of Standards, Washington, D.C.
STANDARD REFERENCE MATERIALS PRICE AND AVAILABILITY LIST
Jan. 1972 28 p
(NBS-SP-360) Avail: NTIS HC $3.50

The Standard Reference Materials Price and Availability List from the National Bureau of Standards for January 1972 is presented. The data concern all classes of material currently available by Standard Reference Material (SRM), Research Material (RM), and General Material (GM) numbers, together with type, unit of issue, and current price. Author

N72-32570*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LOW keV ELECTRON PROBE ANALYSIS OF SILICATE MINERALS FOR Mg, Al, AND Si USING PURE-ELEMENT STANDARDS
G. G. Cunningham Sep. 1972 8 p refs Portions of this paper were presented at the 7th Natl. Conf. of the Electron Probe Analysis Soc. of Am., San Francisco, 17-21 Jul. 1972
(NASA-TM-X-62185) Avail: NTIS HC $3.00 CSCL 11D

Accurate electron probe values for Mg, Al, and Si in silicate minerals may be obtained with pure-element standards. Analysis must be done at low (6 kV) accelerating potential and for best results, the average atomic number of the sample should be within about plus or minus 1 of the atomic number of the pure-element standard. This last requirement is automatically fulfilled for most common silicate minerals, as their average atomic numbers usually fall within the 11 to 15 range. Examples studied include a wet-chemically analyzed cordierite containing 17.71 weight percent Al, for which a value of 17.6 plus or minus 0.3 percent was obtained with the electron probe, and a hornblende containing 19.15 percent Si, which gave 19.0 plus or minus 0.3 percent using the probe method. Author

N72-32571*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADHESION AND TRANSFER OF POLYTETRAFLUORETHYLENE TO METALS STUDIED BY AUGER EMISSION SPECTROSCOPY
Stephen V. Pepper and Donald H. Buckley Washington Oct. 1972 23 p refs
(NASA-TN-D-6983; E-6897) Avail: NTIS HC $3.00 CSCL 11J

The adhesion and transfer of polytetrafluoroethylene (PTFE) to metals in ultrahigh vacuum were studied. The transfer was effected both by compressive static contact and by sliding contact. The transfer observed after static contact was independent of the chemical constitution of the substrate. Electron-induced desorption of the fluorine in the transferred PTFE showed that the fluorine had no chemical interaction with the metal substrate. The coefficient of friction on metals was independent of the chemical constitution of the substrate. However, sliding PTFE on soft metals, such as aluminum, generated wear fragments that lodged in the PTFE and machined the substrate. Author

N72-32572# Oak Ridge National Lab., Tenn.
PROCEEDINGS OF THE CONFERENCE ON CONTINUUM ASPECTS OF GRAPHITE DESIGN
W. L. Greenstreet, ed. and G. C. Battle, Jr., ed. Feb. 1972 759 p refs Conf. held at Gatlinburg, Tenn., 9-12 Nov. 1970
(Contract W-7405-eng-26)
(Conf-701105) Avail: NTIS

Forty-nine conference papers are presented on the design and structural analysis of graphite components. Abstracts are given for 41 of the presentations. NSA

N72-32573# Los Alamos Scientific Lab., N.Mex.
VERDET CONSTANT MEASUREMENTS FOR FARADAY ROTATOR DEVELOPMENT
Donald H. Liebenberg Apr. 1972 5 p refs
(Contract W-7405-eng-36)
(LA-4921) Avail: NTIS

Apparatus for measuring the magneto-optic rotation for a variety of glasses is described. The techniques used and results of the measurements at two wavelengths are discussed. The measurements of rotation of paramagnetic ions in glass were made over a limited temperature range and the results are described in terms of the Van Vleck theory. Author

N72-32574# Molins Machine Co. Ltd., Deptford (England).
THE TRIBIOLOGICAL ASPECTS OF CARBON FIBRE REINFORCED PLASTICS
C. W. Perkins, D. Barber, P. C. Wheeler, and B. Miller London Dept. of Trade and Ind. 1971 172 p ref
(Contract KS/7/0638/C.B.43(A)2)
(D-MAT-173) Avail: NTIS HC $10.75

It is shown that the tribological characteristics of thermoplastics are improved by compounding with carbon fibers when sliding against spheroidal cast iron surfaces. Other tests have shown that this is also true for a wide range of metals at various hardness levels. ESRO

N72-32575# United Technology Center, Sunnyvale, Calif.
CHARACTERIZATION OF WIRE-WOUND TUNGSTEN COMPOSITE Final Report, 1 May 1970 - 30 Sep. 1971
J. G. Hill and F. L. Banta Jan. 1972 198 p refs
(Contract F33615-70-C-1484)
(AD-743978; UTC-2380-FR; AFML-TR-71-245) Avail: NTIS CSCL 11/4

The program was conducted to determine and extend the potential of wirewound tungsten composites for analysis, design, and fabrication of rocket hardware through characterization of its mechanical, thermal, chemical, and physical properties. Specimens, designed specifically for desired structural and thermal analytical properties, were fabricated by previously developed rocket nozzle techniques of plasma-spraying and filament reinforcement. Thermal and mechanical properties were determined for the temperature range of 70 to 4,000 F (21 to 2,210 C). Residual test specimen material was evaluated to characterize physical and chemical properties of both as-composited and elevated temperature exposed wire-wound tungsten. Suitable test methods for nondestructive examinations were determined, and a material specification was prepared based on the program results. Author (GRA)

N72-32576# Ceramic Finishing Co., State College, Pa.
STRENGTHENING OXIDES BY REDUCTION OF CRYSTAL ANISOTROPY

Henry P. Kirchner and Robert M. Gruver Apr. 1972 93 p refs
(Contract N00014-66-C-0190; NR Proj. 032-498)
(AD-744047; TR-6) Avail: NTIS CSCL 11/2

Ceramic bodies of crystals with reduced anisotropy were prepared using compositions in the system Al2O3-Cr2O3. The variation of strength with grain size was measured and compared with data for alumina bodies. The results were interpreted in terms of variations in grain shape and other microstructural features. The dimensions of mirrors in fracture surfaces of alumina and alumina strengthened by quenching were measured. Comparison of the flexural stress vs. mirror size curves was used to estimate the residual stresses in the surface of the quenched alumina. Using the information an experimental residual stress profile was constructed. One exceptional specimen strengthened by quenching had a flexural strength of 223,000 psi.
Author (GRA)

N72-32577# Naval Ordnance Lab., White Oak, Md.
CARBON FIBER SURFACE TREATMENTS
J. V. Larson, T. G. Smith (Maryland Univ.), and P. W. Erickson 29 Oct. 1971 66 p refs
(AD-743469; NOLTR-71-165) Avail: NTIS CSCL 11/5

Three surface treatments for carbon fibers were investigated. Oxidation treatments were found to be generally slow but in some cases quite effective. Liquid oxidations were preferred. Gaseous methods were usually detrimental to the fiber tensile strengths. The oxidation treatments appear to produce a carbon-like surface on the fibers. The solution-reduction treatments were the most effective, producing composite shear strengths up to 12,000 psi. The method is extremely fast, requiring less than one minute of residence time. The characteristics of the fiber surfaces were found to be related to the type of fiber with high-modulus fibers having a graphite-like surface and lower-modulus fibers exhibiting a carbon-like surface. Several other factors, such as surface area, functionality, and wettability, were found to play less important roles in composite shear strengths.
Author (GRA)

N72-32578# Northwestern Univ., Evanston, Ill. Dept. of Materials Science.
INTRINSIC STUDIES OF MATERIALS: SINTERING MECHANISMS OF DEFECT OXIDES Final Report, 5 Oct. 1966 - 31 Jul. 1971
D. Lynn Johnson Jun. 1972 9 p refs
(Contract DAHC04-67-C-0009; Proj. 6730-MC)
(AD-744517; AROD-6730-7-MC) Avail: NTIS CSCL 11/2

The report summarizes an investigation of the influence of deviations from stoichiometry on the sintering of the defect oxide, CoO. The eleven conclusions reached in this investigation are listed in this report and among them are: (1) CoO sinters according to volume diffusion kinetics in the initial and intermediate stages, (2) The sintering rate is increased with increasing oxygen partial pressure above 0.001 atmosphere, (3) The calculated volume diffusion coefficients lie between the tracer values for Co and O in single crystals.
Author (GRA)

N72-32579# Army Aeromedical Research Lab., Fort Rucker, Ala.
IMPROVING US ARMY AIRCRAFT PROPELLER AND TAIL ROTOR BLADE CONSPICUITY WITH PAINT
John K. Crosley, Ronald G. Tabak, Erwin G. Braun, and Robert W. Bailey May 1972 25 p refs
(DA Proj. 3A0-62110-A-819)
(AD-744453; USAARL-72-15) Avail: NTIS CSCL 11/3

Rotating propellers and tail rotors represent a potential hazard for personnel while aircraft are on the ground. This study was conducted to ascertain if rotating blades could be visually detected more easily by the judicious application of paint. A total of twenty-two observers rated nine different paint schemes for effectiveness. The results showed that (1) the two schemes presently being used on Army aircraft rated the poorest of all those investigated, and (2) the most conspicuous scheme was one which had (from the tip toward the hub) a four inch section painted red-orange fluorescent, with the remaining surface divided into thirds and painted alternately flat black and gloss white. The black and white sections of the other half of the blade were reversed to provide a nonconcentric pattern.
Author (GRA)

N72-32580# Boeing Co., Seattle, Wash.
A TETRA CORE STRESS ANALYSIS MODEL Final Report, 28 May - 17 Dec. 1971
Alan L. Dobyns and David C. Jack Apr. 1972 263 p refs
(Contract DAAJ02-71-C-0056; DA Proj. 1F1-62203-A-170)
(AD-744505; D180-14257-1; USAAMRDL-TR-72-17) Avail: NTIS CSCL 11/4

The results of a five-month analytical program are presented, describing a stress analysis method for a three-dimensional fiber composite structure. The intersections of the elements or webs of this structure form polyhedra in the form of triangular prisms, Tetra-core, and truncated forms of these. The finite element model generates the elements and polyhedra automatically with an optimization routine which selects the minimum weight structure that will meet the loads requirement.
Author (GRA)

N72-32581# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
LOW CYCLE COMPRESSIVE FATIGUE FAILURE OF E GLASS-EPOXY COMPOSITES
Gerald Seder and Rodney K. Watterson Mar. 1972 57 p refs
(Contract F44620-70-C-0020; AF Proj. 9782)
(AD-744113; ASRL-TR-162-2; AFOSR-72-0322TR) Avail: NTIS CSCL 11/4

Low-cycle fatigue tests with a mean compressive stress were conducted on modified dogbone-type specimens of 0 degree - 90 degree 3 M SCOTCHPLY laminates with fiber volume fractions ranging from 45 to 60 percent. Based on the test results and microscope observations, the failure mechanism of progressive debonding leading to local buckling and fracture of the fibers parallel to the load axis is proposed. The final result is an inclined shear fracture when cracks in the damaged axial plies propagate through the transverse plies. The effects of misaligning a small percentage of the axial plies within the laminate, and of a 21-day immersion in sea water were also studied. Compressive fatigue strength is found to decrease due to both of these effects.
Author (GRA)

N72-32582# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
THE SHEAR AND THERMAL STRESS BEHAVIOR OF A SUPERREFINED MINERAL OIL AND A FLUOROSILICONE Technical Report, Oct. 1970 - Apr. 1971
Fredrick C. Brooks Jan. 1972 51 p refs
(AF Proj. 7340)
(AD-744106; AFML-TR-71-274) Avail: NTIS CSCL 11/6

Two high temperature hydraulic fluids were characterized as to their shear and thermal stress behavior in the environment of a new small-volume high-temperature evaluation stand. A dewaxed superrefined mineral oil (MIL-H-27601) was investigated at 550, 600, 625, and 700 F and exhibited no significant degradation to 600 F in the inerted system environment. A modified fluorosilicone (MLO-70-79) was investigated at 600 F and experienced a significant loss in viscosity (100 F) after 58 hours of environmental residence.
Author (GRA)

N72-32583# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HEAT RESISTANT REINFORCED POLYMERS AND THEIR APPLICATIONS
W. Surowiak 3 Apr. 1972 16 p refs Transl. into ENGLISH from Tech. Lotnicza i Astronautyczna (Poland), v. 25, no. 12, 1970 p 11-15
(AD-744190; FTD-HC-23-1563-71) Avail: NTIS CSCL 11/9

Heat resistance of plastics and the means of improving it

are discussed in the first part of the paper, in addition to the subject of synthetic polymers with particularly high thermal stability. Applications of high thermal stability plastics in aerospace industries are discussed in the second part.
Author (GRA)

19 MATHEMATICS

Includes calculation methods and theory; and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

N72-32584 Engineering Sciences Data Unit, London (England).
THE RESPONSE OF FIRST- AND SECOND-ORDER SYSTEMS
Jan. 1969 34 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-69005) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The normalized response curves and curves showing maxima in response to some of the input functions are presented. The data are restricted to certain basic forms of input and to systems that can be described by a linear differential equation with constant coefficients. The characteristic equation is therefore a first or second degree polynomial. Author

N72-32585*# Harvard Univ., Cambridge, Mass. Center for Research in Computing Technology.
GAP-MINIMAL SYSTEMS OF NOTATIONS AND THE CONSTRUCTIBLE HIERARCHY
Miriam Laura Lucian 1972 69 p refs
(Grant NGR-22-007-176)
(NASA-CR-128195; Rept-13-72) Avail: NTIS HC $5.50 CSCL 12A

If a constructibly countable ordinal alpha is a gap ordinal, then the order type of the set of index ordinals smaller than alpha is exactly alpha. The gap ordinals are the only points of discontinuity of a certain ordinal-valued function. The notion of gap minimality for well ordered systems of notations is defined, and the existence of gap-minimal systems of notations of arbitrarily large constructibly countable length is established.
Author

N72-32586*# Techtran Corp., Glen Burnie, Md.
SOLUTION OF CERTAIN BOUNDARY PROBLEMS OF MATHEMATICAL PHYSICS BY THE COLLOCATION METHOD
A. I. Ivanov Washington NASA Aug. 1972 24 p refs Transl. into ENGLISH of 'Resheniye Nekotorykh Krayevykh Zadach Matematicheskoy Kiziki Metodom Kollokatsii", Acad. of Sci. USSR, Inst. for Space Res., Moscow, rept Pr-98, 1972 31 p
(Contract NASw-2037)
(NASA-TT-F-14371; Pr-98) Avail: NTIS HC $3.25 CSCL 12A

A simple and effective means of solving a number of boundary problems of mathematical physics by the collocation method is presented. Questions concerning existence, and convergence of approximate solutions found with this method are discussed. Estimates of the speed of convergence of approximate solutions to the exact solution are included. Author

N72-32587*# Houston Univ., Tex.
DIFFERENTIAL CORRECTION SCHEMES IN NONLINEAR REGRESSION
Henry P. Decell, Jr. and F. M. Speed (Texas A and I Univ.) Washington NASA Sep. 1972 17 p refs
(Contract NAS9-12777)
(NASA-CR-2119; MSC-S-352) Avail: NTIS HC $3.00 CSCL 12A

Classical iterative methods in nonlinear regression are reviewed and improved upon. This is accomplished by discussion of the geometrical and theoretical motivation for introducing modifications using generalized matrix inversion. Examples having inherent pitfalls are presented and compared in terms of results obtained using classical and modified techniques. The modification is shown to be useful alone or in conjunction with other modifications appearing in the literature. Author

N72-32588*# National Aeronautics and Space Administration, Washington, D.C.
A GENERALIZATION OF THE REGULA FALSI FOR THE APPROXIMATE CALCULATION OF NULL POINTS OF A SYSTEM OF NONLINEAR EQUATIONS
Leonhard Bittner Jun. 1972 16 p refs Transl. into ENGLISH from Wiss. Z. Tech. Hochsch. (Dresden), v. 9, 1959/60 p 325-329
(NASA-TT-F-14420) Avail: NTIS HC $3.00 CSCL 12A

A generalization of the regula falsi is presented, assuming a vector x of a real n-dimensional Euclidean space and a function u(x) defined by, and projected into, the Euclidean space. It is required to determine a certain null point of u(x), the existence of which is assumed. The task of the regula falsi is to substitute the nonlinear relationship between x and u by a linear relationship $v = Ax$ = a which coincides with the nonlinear relationship $u = u(x)$ in two specified points and to consider its null point as an approximation for the null point of u(x). Author

N72-32589# RAND Corp., Santa Monica, Calif.
AN IMPOSSIBILITY THEOREM FOR GROUP PROBABILITY FUNCTIONS
N. Dalkey Jun. 1972 7 p refs Presented at NSF Conf. on Subjective Optimality, Ann Arbor, Michigan, 16-21 Jul. 1972
(P-4862) Avail: NTIS HC $3.00

The theorem is proved that under several natural assumptions, there is no aggregation function for individual probability estimates which itself is a probability function. Author

N72-32590*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOME EFFICIENT METHODS FOR OBTAINING INFINITE SERIES SOLUTIONS OF n-th ORDER LINEAR ORDINARY DIFFERENTIAL EQUATIONS
Gabriel Allen Washington Sep. 1972 47 p refs
(NASA-TR-R-390; E-7058) Avail: NTIS HC $3.00 CSCL 12A

The use of the theta-operator method and generalized hypergeometric functions in obtaining solutions to nth-order linear ordinary differential equations is explained. For completeness, the analysis of the differential equation to determine whether the point of expansion is an ordinary point or a regular singular point is included. The superiority of the two methods shown over the standard method is demonstrated by using all three of the methods to work out several examples. Also included is a compendium of formulae and properties of the theta operator and generalized hypergeometric functions which is complete enough to make the report self-contained. Author

N72-32591*# National Aeronautics and Space Administration, Washington, D.C.
ESTIMATION OF ERROR FOR APPROXIMATE SOLUTIONS OF SYSTEMS OF FIRST-ORDER DIFFERENTIAL EQUATIONS
H. Eltermann Jun. 1972 71 p refs Transl. into ENGLISH from Math. Z. (West Germany), v. 62, 1955 p 469-501
(NASA-TT-F-14432) Avail: NTIS HC $5.75 CSCL 12A

A series of theorems and their proofs are given for the estimation of error for approximate solution of a system of differential equations of the first order. A.L.

N72-32592*# National Aeronautics and Space Administration, Washington, D.C.
RELATION BETWEEN SYSTEMS OF POLYNOMIALS

ORTHOGONAL WITH RESPECT TO VARIOUS DISTRIBUTION FUNCTIONS
V. B. Uvarov Mar. 1972 21 p refs Transl. into ENGLISH from Vychisl. Mat. i Mat. Fiz. (USSR), v. 9, no. 6, Nov.-Dec. 1969 p 1253-1262
(NASA-TT-F-14480) Avail: NTIS HC $3.25 CSCL 12A

The problem is discussed of finding polynomials P bar sub n (x) orthogonal with respect to the distribution function rho bar (x), simply expressed in terms of rho(x), from polynomials P sub n (x) orthogonal with respect to the distribution function rho(x). First a general Christoffel formula is derived. Then the relation between systems of polynomials orthogonal with respect to distribution functions which differ by a piecewise constant function are considered. Author

N72-32593# Commissariat a l'Energie Atomique, Saclay (France).
ANALYTICAL REPRESENTATION OF TIME CORRELATION FUNCTIONS AND APPLICATION TO RELAXATION PROBLEMS Ph.D. Thesis
Marc Dupuis Oct. 1971 128 p refs In FRENCH
(CEA-R-3597) Avail: AEC Depository Libraries

Transport phenomena and temporal correlation functions are considered for statistical equilibrium mechanics, and the partition functions are evaluated. Correlation and autocorrelation functions are discussed in relation to the definition of moment development. The relation between representations in moments and in continuous fraction is reviewed for the case of a dynamic general variable. The analytic properties of such representations are also considered. Transl. by K.P.D.

N72-32594# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
TEN PLACE TABLES OF THE JACOBIAN ELLIPTICAL FUNCTIONS. PART 4: ARGUMENTS AT RATIONAL FRACTIONS OF THE QUARTER PERIOD Final Report
Henry E. Fettis and James C. Caslin Feb. 1972 407 p refs
(AF Proj. 7071)
(AD-741781; ARL-72-0019-Pt-4) Avail: NTIS CSCL 12/1

Ten place tables of the Jacobian elliptic functions are presented, including am(u,k), sn(u,k), dn(u,k) where u = mk/n, for k squared = 0(.01).99, m = o(1)(n-1), n = 11(1)20. This tabulation was suggested as an aid in the design and analysis of ultrasharp elliptic filters. Author (GRA)

N72-32595# Wisconsin Univ., Madison. Mathematics Research Center.
SOLUTION OF A DUAL PROBLEM IN OPTIMAL CONTROL THEORY 1 Technical Summary Report
Earl R. Barnes Jan. 1972 27 p refs Presented at the SIAM Natl. Meeting, Seattle, 28-30 Jun. 1971
(Contract DA-31-124-ARO(D)-462)
(AD-743795; MRC-TSR-1187) Avail: NTIS CSCL 12/1

In the report the author considers a fixed endpoint problem in optimal control theory. The problem is given a dual formulation and an iterative procedure for solving the dual problem is described. The results of two numerical experiments are discussed to illustrate how the method works in particular instances. Author (GRA)

N72-32596# Army Foreign Science and Technology Center, Charlottesville, Va.
SOLUTION OF ONE PROBLEM IN NONLINEAR PROGRAMMING
G. T. Kalchenko and A. Ya. Shidlovskii 1972 8 p refs Transl. into ENGLISH from Izv. Akad. Nauk Latv., Ser. Fiz. i Tekh Nauk (Riga), no. 3, 1966 p 93-96
(AD-743569; FSTC-HT-23-848-71) Avail: NTIS CSCL 12/1

The article presents an approximate method for solution of the problem of maximization of a nonlinear separable function with bilateral limitations on the unknowns and fixed general lower boundary of the modulus of the unknowns difference. The possibility is demonstrated of applying this method to some problems of air traffic control. Author (GRA)

20 METEOROLOGY

Includes climatology; weather forecasting; and visibility studies. For related information see also: 13 Geophysics; and 30 Space Sciences.

N72-32597 National Lending Library for Science and Technology, Boston Spa (England).
A THEORY OF STRATIFORM CLOUD. 1: THE GENERAL EQUATIONS
M. J. Buikov and M. I. Dekhtyar Aug. 1972 29 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst. (Leningrad), no. 70, 1968 p 3-19
(NLL-RTS-7056) Avail.: Natl. Lending Library, Boston Spa, Engl.: £2.90; 10 NLL photocopy coupons

A general system of equations is considered which describes the evolution of stratiform cloud taking into account its discrete structure. Based on the transition to a turbulent atmosphere, the following are discussed: (1) an expression describing the elementary processes of droplet growth and the activation of condensation nuclei; (2) the general laws of persistence and boundary conditions; and (3) a general scheme for the solution of problems. Author

N72-32598 National Lending Library for Science and Technology, Boston Spa (England).
A THEORY OF STRATIFORM CLOUD. 2: THE EVOLUTION OF CLOUD IN A NONPERTURBED ATMOSPHERE
M. I. Dekhtyar and M. V. Buikov Jul. 1972 37 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst. (Leningrad), no. 70, 1968 p 21-49
(NLL-RTS-7057) Avail: Natl. Lending Library, Boston Spa, Engl.: £3.70; 12 NLL photocopy coupons

The growth is examined of a collection of drops in an air mass rising with constant velocity; calculations are made of the supersaturation in the cloud and the number of activated condensation nuclei. It is shown that the upper boundary of the cloud tends towards a constant value and the radius of drops near it is such that their rate of fall is equal to the velocity of the upward movement. The number of drops near the upper boundary increases without limit, which may cause coagulation processes to predominate over the condensation ones and lead to the formation of falling droplets with the ability to convert to precipitation particles. It is shown that the giant condensation nuclei and the drops forming on them circulate near the lower boundary of the cloud. Author

N72-32599 National Lending Library for Science and Technology, Boston Spa (England).
A THEORY OF STRATIFORM CLOUD. 3: THE EFFECT OF TURBULENT DIFFUSION ON THE CLOUD DROP SPECTRUM
M. V. Buikov and M. I. Dekhtyar Jul. 1972 20 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst. (Leningrad), no. 70, 1968 p 50-65
(NLL-RTS-7058) Avail: Natl. Lending Library, Boston Spa, Engl.: £2.00; 7 NLL photocopy coupons

Calculations are made for the supersaturation and the distribution function of drops by size in a stratified cloud. The drop spectrum obtained is compared with an empirical normal-logarithmic distribution. Author

N72-32600 National Lending Library for Science and Technology, Boston Spa (England).
A THEORY OF STRATIFORM CLOUD. 4: THE EVOLUTION OF A LOW LAYER CLOUD IN THE TRANSFORMATION OF THE AIR MASS BY THE ACTION OF THE UNDERLYING SURFACE
M. I. Dekhtyar and M. V. Buikov Jul. 1972 13 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst.

(Leningrad), no. 70, 1968 p 66-75
(NLL-RTS-7059) Avail: Natl. Lending Library, Boston Spa, Engl.: £1.30; 4 NLL photocopy coupons

An investigation is made of the formation and evolution of a low layer cloud originating in the transformation of a warm air mass over a cold underlying surface. For simplicity it is supposed that the temperature drop between underlying layers is constant, in the initial condition the air mass is in a uniform state, and the velocity of the wind and turbulent diffusion are independent of height. Author

N72-32601 National Lending Library for Science and Technology, Boston Spa (England).
A THEORY OF STRATIFORM CLOUD. 5: THE EFFECT OF TURBULENT DIFFUSION ON THE SPECTRUM OF LARGE DROPS
M. I. Dekhtyar and M. V. Buikov Jul. 1972 13 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst. (Leningrad), no. 70, 1968 p 76-85
(NLL-RTS-7060) Avail: Natl. Lending Library, Boston Spa, Engl.: £1.30; 4 NLL photocopy coupons

The character of the asymptotic size distribution of large drops in stratiform clouds and the effects of turbulent diffusion on the distribution are studied. It is shown that, for a constant rate of fall of the drops, turbulent diffusion has an inverse power character. Author

N72-32602 National Lending Library for Science and Technology, Boston Spa (England).
A THEORY OF STRATIFORM CLOUD. 6: A SIMPLER MODEL OF A THREE-PHASE STRATIFORM CLOUD
M. J. Buikov and V. L. Sigal Jul. 1972 22 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst. (Leningrad), no. 70, 1968 p 86-101
(NLL-RTS-7061) Avail: Natl. Lending Library, Boston Spa, Engl.: £2.20; 7 NLL photocopy coupons

An examination is made of a stratiform cloud model containing, besides gaseous and liquid droplet water, crystals of ice as well. A calculation of the distillation of the moisture from droplets to crystals is made, taking account of sedimentation. Estimates are made of the conditions for full crystallization of the cloud, the effect of the presence of the crystals on the activation of the condensation nuclei, and the conditions under which the layer separation of the cloud into purely crystalline and mixed portions may be observed. Author

N72-32603 International Geophysical Year World Data Center A, Asheville, N.C.
HIGH ALTITUDE METEOROLOGICAL DATA, VOLUME 7, NO. 12, DECEMBER 1970
Dec. 1970 233 p
Avail: SOD $3.00

Wind and temperature measurements from all available meteorological sounding rocket firings are presented, along with computed values for pressure, density, and speed of sound. Local radiosonde observations nearest the time of firing are included. Statistical tables and graphs of current month means and standard deviations for all parameters with long-term means are also presented. Author

N72-32604*# Scientific Translation Service, Santa Barbara, Calif.
THE DAILY COURSE OF ENERGY WITHIN THE AIR LAYER NEAR THE GROUND
H. Kraus Washington NASA Sep. 1972 32 p refs Transl. into ENGLISH from Arch. Meteorol., Geophys. Bioklimatol., Ser. A (Vienna), no. 3/4, 1963 p 491-515
(Contract NASw-2035)
(NASA-TT-F-14552) Avail: NTIS HC $3.75 CSCL 04B

The phenomena are studied in the air layer near the ground like heating, cooling, formation and dissolution of fog, which are caused by the divergence of the radiation balance and the divergences of fluxes effected by exchange of sensible and latent heat. These divergences show a characteristic daily variation like temperature and heat fluxes. The daily variations of these divergences and of the variations of sensible and latent heat in a given air layer are in close relation according to the law of the maintenance of energy. In their totality they constitute the daily variation of the energy economy of that air layer. The daily variation of the energy economy of the six first meters of the atmosphere for two different cases are computed and discussed. The combined action of the processes of radiation and exchange is thus demonstrated by the phenomena in the air layer near the ground. Author

N72-32605*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
HURRICANE PREPAREDNESS AND CONTROL PLAN
May 1972 53 p ref
(NASA-TM-X-68615; FEC-CTC-5051) Avail: NTIS HC $4.75 CSCL 04B

This plan establishes policy and sets forth guidance, responsibilities and procedures utilized by Federal Electric Corp., communications department in support of the KSC Emergency Preparedness Plan, Annex A, Hurricane Control Plan (GP-355) dated 27 May 1971. This plan covers all FEC communications department personnel, facilities, and equipment situated at the Kennedy Space Center that are the responsibility of FEC contract NAS 10-4967. Author

N72-32606# Bureau of Meteorology, Melbourne (Australia).
WINDS AND WAVES IN BASS STRAIT Meteorological Summary Report
R. L. Falconer and D. J. Linforth Apr. 1972 59 p refs
Avail: NTIS HC $5.00

The characteristics of the surface wind field over the oceans surrounding the Bass Strait area have been derived from synoptic weather charts. Using this wind field the significant heights and periods of ocean waves in the Otway region and in East Bass Strait were derived using the Sverdrup, Munk, Bretschneider techniques. Six hourly surface synoptic charts prepared in the Central Analysis Office of the Bureau of Meteorology have been used. The nominal chart times are 0500, 1100, 1700, and 2300 GMT. The data coveres a 17 year period from 1951 to 1967 inclusive. Author

N72-32607# National Environmental Satellite Service, Washington, D.C.
EVALUATION OF A TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES
Carl O. Erickson Sep. 1972 31 p refs
(NOAA-TM-NESS-42) Avail: NTIS HC $3.75

An experiment was carried out in March 1972 to evaluate a cyclone forecasting technique as it existed at that time. Eleven participants made estimates of current storm intensity (C.I.) from 33 tropical storms and disturbances in the Atlantic and Pacific. These estimates were compared with independent measurements of maximum wind speed (MWS) and central sea level pressure (PPP). Favorable results using the Dvorak technique to estimate MWS, particularly for weak storms, led to its adoption operationally in modified form. Three-way correlations between C.I., MWS, and PPP are discussed. The results for the Atlantic were significantly different from those for the Western Pacific. Author

N72-32608*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SURFACE REFRACTIVITY MEASUREMENTS AT NASA SPACECRAFT TRACKING SITES
P. E. Schmid Washington Sep. 1972 49 p refs
(NASA-TN-D-6822; G-1052) Avail: NTIS HC $3.00 CSCL 04B

High-accuracy spacecraft tracking requires tropospheric modeling which is generally scaled by either estimated or

measured values of surface refractivity. This report summarizes the results of a worldwide surface-refractivity test conducted in 1968 in support of the Apollo program. The results are directly applicable to all NASA radio-tracking systems. Author

N72-32609# State Univ. of New York, Albany. Atmospheric Sciences Research Center.
LAKE EFFECT STORM STUDY Final Report
Vincent J. Schaefer Feb. 1971 43 p
(Grant NSF GF-280)
(Publ-142) Avail: NTIS HC $4.25

Narrative accounts of trips to Sapporo, Japan, to study intense snowstorms in the vicinity of the Ishikari Plain are presented. The intense snowstorms occur when cold Siberian air flows over relatively warm waters of the Sea of Japan and are similar to the intense snowstorms which occur when cold Canadian Arctic air flows over warm waters of Lake Erie and Lake Ontario. The study is part of a Japanese-U.S. cooperative effort, and a trip of Japanese scientists to the U.S. is mentioned. N.E.N.

N72-32610# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Labs.
ATMOSPHERIC TRANSPORT AND DIFFUSION IN THE PLANETARY BOUNDARY LAYER, JULY 1970 - JUNE 1971
I. VanderHoven, ed. Sep. 1971 87 p refs
(TID-25979) Avail: NTIS

Results of studies of atmospheric transport and diffusion in the planetary boundary layer, micrometeorology, and diffusion climatology are presented. Information is included on three-dimensional trajectories in the Los Angeles Basin, planetary boundary layer dynamics, energy profiles of wind fluctuations, wake turbulence and diffusion, mesoscale transport and dispersion, and automated processing and graphics for the large data base 1969 Los Angeles study. NSA

N72-32611# University Coll., London (England). Dept. of Physics.
DETERMINATION OF AIR DENSITY, TEMPERATURE AND WINDS AT HIGH ALTITUDE Final Report, 1 Aug. 1968 - 31 Dec. 1971
Gerald V. Broves, David Rees, and Andrew F. D. Scott Feb. 1972 30 p refs
(Contract F61052-68-C-0057; AF Proj. 8605)
(AD-742325; AFCRL-72-0268) Avail: NTIS CSCL 04/1

The report reviews the research carried out at University College London on (1) the development and comparison of techniques for extending and improving wind and temperature measurement; (2) synoptic studies in the stratosphere and mesosphere; (3) winds and temperatures in the high-latitude winter thermosphere; and (4) atmospheric circulation. Author (GRA)

N72-32612# Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
RESULTS OF AEROLOGICAL OZONE SOUNDINGS AT THE HOHENPEISSENBERG METEOROLOGICAL OBSERVATORY Semiannual Report, Jul. - Dec. 1971
Walter Attmannspacher Mar. 1972 142 p
(Contract DAJA37-71-C-3347)
(AD-741882; SAR-2) Avail: NTIS CSCL 04/1

Contents: Statistic of the Ozone soundings 1971; Code of tables of Ozone sonde ascents; Ozone tables, Ozonagrams; Code of tables of TEMP calculations; Results of radio sonde measurements. GRA

N72-32613# Texas A&M Research Foundation, College Station.
EVALUATION OF ATMOSPHERIC TRANSPORT AND DIFFUSION Semiannual Report, 15 Jun. - 15 Dec. 1971
Tom E. Sanford May 1972 33 p ref
(Contract DAAB07-68-C-0381)
(AD-744482; ECOM-0381-7; SAR-7) Avail: NTIS CSCL 04/2

The major portion of contractural effort during the period covered by this report has been devoted to verification of the wiring of the general purpose analog computer patchboards which contain the system of equations proposed for simulating a tropical forest atmosphere. Included in this verification has been the establishment of a procedure that will permit checking of all wiring connections in a minimum amount of time. A set of data representative of a tropical forest atmosphere has been assembled for initial testing of the proposed equation system. These data are included in this report along with a brief description of the environment in which the data were collected. Tentative solutions obtained by use of these data as input values for the tropical forest equations are included in order to illustrate the nature of the simulation. Author (GRA)

N72-32614# Naval Weather Service Command, Washington, D.C.
SUMMARY OF SYNOPTIC METEOROLOGICAL OBSERVATIONS. JAPANESE AND KOREAN COASTAL MARINE AREAS, VOLUME 5. AREA 13: CENTRAL EAST CHINA SEA. AREA 14: NORTHERN EAST CHINA SEA. AREA 15: NAGASAKI
May 1972 483 p
(AD-743488) Avail: NTIS CSCL 04/2

The data contained in these tables were obtained from tape data Family 11 (TDF-11), Marine Surface observations. TDF-11 was primarily funded by the Naval Weather Service Command and selected by NWSED Asheville as the most comprehensive collection of marine surface observations from which to develop a series of coastal marine summaries. The source was punched cards of weather observations taken aboard vessels of varying registry. They were recorded on magnetic tape in a common format. Elements not in WMO code were converted to this code where possible. Where this was not possible, the original data were retained within the tape record as supplemental data. A very limited quality control was attempted as the punched cards were converted to taped records and, where possible, missing psychrometric data were computed. Author (GRA)

N72-32615# Naval Postgraduate School, Monterey, Calif.
A THREE DIMENSIONAL STAGGERED GRID PRIMITIVE EQUATION MODEL FOR APPLICATION OF MESOSCALE ATMOSPHERIC MOTIONS M.S. Thesis
Robert Bozich Mar. 1972 51 p refs
(AD-742945) Avail: NTIS CSCL 04/2

A three dimensional staggered grid model, based on the Boussinesq equations, is developed and applied to mesoscale waves. The model is tested with a three-dimensional stable gravity wave and forecasts for 40 time steps are compared with the analytic solutions and also with a full grid model. Comparisons show very good agreement with both forecasts for the stated time. Failure of the relaxation scheme to meet the convergence criterion after 47 time steps is discussed. Author (GRA)

N72-32616# Air Weather Service, Scott AFB, Ill.
NOTES ON ANALYSIS AND SEVERE-STORM FORECASTING PROCEDURES OF THE AIR FORCE GLOBAL WEATHER CENTRAL Final Report
Robert C. Miller May 1972 184 p refs
(AD-744042; AWS-TR-200-Rev) Avail: NTIS CSCL 04/2

This collection of notes discusses the various types of severe-weather air masses, how severe weather systems form, which parameters best define the existence and intensity of severe weather, and how to use local information to better forecast the occurrence of phenomena at individual stations. Specifically, wind gust and hailsize forecasting techniques and the usefulness of various stability indexes are presented. Also, a chapter on severe weather in tropical air masses is included. A number of detailed case studies are in the report to help the reader visualize how forecasting concepts are applied, and to emphasize the importance of forecasting experience. The revised material concentrates on the application of computer-derived

aids to severe weather forecasting produced by the Air Force Global Weather Central. Foremost among these aids are analyses and prognoses of the Severe Weather Threat (SWEAT) Index.
Author (GRA)

N72-32617# Air Weather Service, Scott AFB, Ill.
WEATHER WARNINGS (PACIFIC AREA)
15 May 1972 13 p Supersedes AWSM-105-8-Vol-3, 22 Sep. 1970
(AD-741827; AWS-Manual-105-8-Vol-3) Avail: NTIS CSCL 04/2

The paper states the procedures to be followed by 1 Weather Wing units for issuing weather warning advisories and point weather warnings, and includes typhoon/hurricane warning procedures. It is directive on all 1 Weather Wing units.
Author (GRA)

N72-32618# White Sands Missile Range, N.Mex.
THE 13001 HONEST JOHN LASER, MISSILE NO. 141, ROUND NO. 618 ROL (29 MARCH 1972)
Mar. 1972 38 p
(DA Proj. 1T6-65702-D-127-02)
(AD-743839; DR-706) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 13001 Honest John Laser, Missile Number 141, Round Number 618 ROL, are presented in tabular form.
Author (GRA)

N72-32619# White Sands Missile Range, N.Mex.
THE 13401 HONEST JOHN, MISSILE NO. 352, ROUND NO. 620 RML Meteorological Data Report
May 1972 30 p
(DA Proj. 1T6-65702-D-127)
(AD-743840; DR-710) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 13401 Honest John Missile Number 352, Round Number 620 RML, are presented in tabular form.
GRA

N72-32620# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 03702 HONEST JOHN, MISSILE NO. 1624, ROUND NO. 623 AML Meteorological Data Report
May 1972 29 p
(DA Proj. 1T6-65702-D-127)
(AD-743841; DR-714) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 03702 Honest John, Missile Number 1624, Round Number 623 AML, are presented in tabular form.
Author (GRA)

N72-32621# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
WHITE SANDS MISSILE RANGE CLIMATE CALENDAR
George M. Fugate and John A. Chambers Apr. 1972 29 p Revised
(DA Proj. 1T6-65702-D-127)
(AD-743842; DR-707-Rev) Avail: NTIS CSCL 04/2

The report is the fifth edition of the White Sands Missile Range Climate Calendar, which was first published in May, 1963. Mean daily maximum and minimum temperatures, and extreme temperatures for the period of record (1950-1971) are tabulated in calendar form for A Station, the forcast center located at Headquarters, White Sands Missile Range, New Mexico. Averages of temperature, relative humidity, wind and cloudiness are included for each month, as well as maximum 24-hour and monthly rainfall. Supplementary tables give monthly, seasonal and annual values of maximum winds, degree dwys, solar radiation, means and extremes of station pressure, the greatest monthly and single-storm snowfall, and the average six-hourly relative humidities.
Author (GRA)

N72-32622# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 12808 LANCE, MISSILE NO. 2146, ROUND NO. 157 SPL (20 APRIL 1972) Meteorological Data Report
Apr. 1972 48 p
(DA Proj. 1T6-65702-D-127)
(AD-743843; DR-708) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 12808 Lance, Missile Number 2146, Round Number 157 SPL, are presented in tabular form.
Author (GRA)

N72-32623# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 11602 LANCE, MISSILE NO. 2131, ROUND NO. 156 EST (27 MARCH 1972) Meteorological Data report
Apr. 1972 65 p
(DA Proj. 1T6-65702-D-127)
(AD-743844; DR-705) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 11602 Lance, Missile Number 2131, Round Number 156 EST, are presented in tabular form.
Author (GRA)

N72-32624# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
HAILSTONE EXTREMES FOR DESIGN Air Force Surveys in Geophysics
Irving I. Gringorten 27 Dec. 1971 31 p refs
(AF Proj. 8624)
(AD-743831; AFCRL-72-0081; AFCRL-AFSIG-238) Avail: NTIS CSCL 04/2

To a climatologist, concerned with design criteria, hailstones offer one of the greatest challenges. The risk or probability of occurrence of hailstones is needed for the revision of MIL-STD-210A, Climatic Extremes for Military Equipment. Eventually some kind of instrumentation, using radar or hailpads, is expected to measure the destructive power of hailstorms, but for this study, the literature had led only to tentative figures for the distribution of diameters.
Author (GRA)

N72-32625# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
AIR DROPPABLE WIRE DISPENSERS FOR ATMOSPHERIC ELECTRICITY STUDIES
C. B. Kalakowsky, V. C. Fields, R. P. Harrison, G. C. Hirst, R. W. Whidden, and E. A. Lewis 28 Mar. 1972 19 p refs
(AD-743863; AFCRL-72-0228; AFCRL-IP-176) Avail: NTIS CSCL 04/2

A description is given of the design, construction, and testing of an instrumented canister, which dispenses 6000 ft of thin wire when dropped from an aircraft. The wire is pulled-off from a parachute-supported bobbin by the weight of a telemetry unit. These devices are intended for use in thunderstorms to provide information on the artificial triggering of lightning strokes.
Author (GRA)

N72-32626# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
RAWIN RADAR TARGET
Thomas J. Richter Feb. 1972 50 p refs
(DA Proj. 1H6-64705-D-511)
(AD-743457) Avail: NTIS CSCL 04/2

Seven radar reflectors are evaluated for use as meteorological rawin radar targets. The targets are to provide useful radar signal returns at distances of 160 kilometers for use with the Automatic Atmospheric Sounding Set AN/TMQ-19( ).
Author (GRA)

N72-32627# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
TURBULENCE CHARACTERISTICS AT HEIGHTS OF 1.5, 4.0 AND 16.0 METERS AT WHITE SANDS MISSILE

RANGE, NEW MEXICO
Richard Pena, Laurence J. Rider, and Manuel Armendariz Jan. 1972 50 p refs
(DA Proj. 1T0-61102-B-53-A)
(AD-743456; ECOM-5421) Avail: NTIS CSCL 04/2

Turbulence characteristics of wind and temperature data over heterogeneous terrain at White Sands Missile Range, New Mexico are presented. More than 140 hours of data, collected in 2- to 7-hour increments during January, March and April of 1970, are graphically represented. The varied turbulence parameters are shown as functions of the Monin-Obukhov stability index, z/L. The data presented include z/L in the range from -0.60 to 0.50. It is also shown that longitudinal stress due to transfer of lateral momentum can be neglected under near-neutral conditions but not for diabatic conditions.
Author (GRA)

N72-32628# Naval Postgraduate School, Monterey, Calif.
FORECASTING THE MOTION OF NORTHEASTERN PACIFIC TROPICAL CYCLONES M.S. Thesis
David Lansing Freeman Mar. 1972 60 p refs
(AD-743763) Avail: NTIS CSCL 04/2

Several operational methods of forecasting the motion of tropical cyclones over the northeast Pacific Ocean area are evaluated for three 1970 and nine 1971 hurricanes. OFFICIAL forecast accuracy is shown to excel that of TYRACK (1971 only) and HATRACK (both years). The MODIFIED HATRACK (MODHATR) forecast scheme developed by the Navy in Monterey, California, comprising a numerical steering component (HATRACK) with a statistical modification (correction for bias in HATRACK) is applied to the same 1970-71 operational data, with the result that the MODHATR accuracy, using 850 mb steering, is shown to be superior to HATRACK and TYRACK while only slightly inferior to the OFFICIAL forecasts.
Author (GRA)

N72-32629# Naval Postgraduate School, Monterey, Calif.
A STATISTICAL MODEL OF ATMOSPHERIC TEMPERATURE SIGNALS M.S. Thesis
Edward Marvin Kline Mar. 1972 63 p refs
(AD-743760) Avail: NTIS CSCL 04/2

The ramp is an often observed feature in temperature fluctuations during unstable atmospheric conditions. It is characterized by a gradual increase in temperature followed by a sudden drop to an ambient level. This ramp clearly distinguishes temperature signals from other turbulence signals such as velocity. Three different ramp-type atmospheric temperature fluctuations and their derivatives are constructed and statistically examined for the parameters skewness and coefficient of excess. These statistical values are compared with values obtained from actual signals.
Author (GRA)

N72-32630# Naval Postgraduate School, Monterey, Calif.
NUMERICAL INTEGRATION EXPERIMENTS WITH A BAROTROPIC PRIMITIVE EQUATION MODEL M.S. Thesis
Jimmy Ray Slaughter Mar. 1972 38 p refs
(AD-743748) Avail: NTIS CSCL 04/2

Experiments are carried out with various time and space differencing schemes applied to the barotropic primitive equations using both real data and a particular stream function which is an analytic solution to the nondivergent barotropic vorticity equation. With both types of data there were some significant differences in the forecasts produced by the various schemes. Replacement of the widely used leap frog (centered) scheme by others which eliminate or lessen some of its inherent errors at the expense of more computer time or storage appears to be justified at such time when computer capacity no longer restricts operational use of these more time consuming schemes.
Author (GRA)

N72-32631# Army Edgewood Arsenal, Md.
INFRARED ABSORPTIVITY OF ICE Ih AND ITS ATMOSPHERIC EMISSION Technical Report, Jun. - Nov. 1971
Hugh R. Carlon May 1972 13 p refs
(DA Proj. 1B6-22706-A-102)
(AD-743445; EA-TR-4648) Avail: NTIS CSCL 04/2

Quantitative spectra of atmospheric ice Ih are presented for 3.4 to 15 micrometers, and absorptivity coefficients for ice and liquid water at 8 to 14 micrometers are presented and compared. A modified equation modeling contributions of water in the vapor, liquid, and ice Ih phases to total atmospheric emission is presented. In the infrared continuum at 8 to 14 micrometers, traces of either ice Ih or liquid water aerosol can affect radiance measurements more strongly than large concentrations of the vapor. Whereas water vapor has been studied extensively as a source of infrared emission in the atmosphere, liquid water and ice contributions have been appreciated only recently.
Author (GRA)

N72-32632# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
SOME OBSERVATIONS OF METEOROLOGICAL EFFECTS ON OPTICAL WAVE PROPAGATION
Thomas H. Pries, Jack Smith, and Marvin A. Hamiter Fort Monmouth, N. J. Apr. 1972 23 p refs
(DA Proj. 1TO-61102-B-53-A)
(AD-744472; ECOM-5434) Avail: NTIS CSCL 04/1

Values for the refractive index structure coefficient, (C sub n) squared, were determined from spaced temperature probe measurements and from measurements of the log-amplitude variations in a laser beam. The values of (C sub n) squared obtained from the optical measurements were smaller than the values obtained from the temperature measurements. Variations in (C sub n) squared derived by the two methods were in good agreement even though the values obtained optically are over a 440-meter path while the temperature-derived values are essentially point measurements. The variations in the measured horizontal winds along the leeward side of the optical path showed a structure closely related to the optically derived (C sub n) squared variations.
Author (GRA)

N72-32633# Wayne State Univ., Detroit, Mich. Research Inst. for Engineering Sciences.
STUDIES OF ATMOSPHERIC PROCESSES Semiannual Technical Report
Frederick P. Boynton, Edward R. Fisher, Ralph H. Kummler, and Pieter K. Rol 15 Dec. 1971 47 p refs
(Contract F19628-72-C-0007; ARPA Order 1856)
(AD-744081; AFCRL-72-0124; SATR-1) Avail: NTIS CSCL 04/1

The research described in the report is aimed at characterizing the non-equilibrium flow and coupled chemistry associated with the interaction of rocket exhaust effluents in the upper atmosphere. Several aspects of current study should be noted. Although continuum fluid descriptions based on the Navier-Stokes equations are valid at low altitudes, at high altitudes rarified effects must be considered. To investigate this transition and the ultimate analytical modeling of rarified flows, a Monte Carlo technique applied to a Boltzmann equation formulation is being studied.
Author (GRA)

N72-32634# R and D Associates, Santa Monica, Calif.
HISTORICAL CLIMATOLOGY Semiannual Technical Report
Leona M. Libby Apr. 1972 6 p
(Contract F44620-72-C-0025; ARPA Order 1964)
(AD-744129; RDA-TR-061-NMO; AFOSR-72-1214TR) Avail: NTIS CSCL 04/2

The research program in Historical Climatology has the general purpose to show feasibility of determining global climate in the past, by determining past trends in surface temperature of the earth. The method being studied involves measuring past temperatures using isotope thermometers in bio-organic data bases. For example, isotope ratios in tree rings being formed are expected to change if the temperature changes so that tree rings formed long ago may exhibit different ratios than those being

formed today. Lower limits on the temperature co-efficients have been computed, and compared favorably with experimental coefficients. New measurements of these coefficients have been undertaken. Feasibility of measurement of the isotope ratio by neutron activation for oxygen is under study, as an independent check on measurement by mass spectroscopy. Author (GRA)

N72-32635# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
VERY SHORT RANGE LOCAL AREA WEATHER FORECASTING SATELLITES Final Report, 1 Nov. 1970 - 31 Jan. 1972
Gerald J. Sikula 30 Apr. 1972 84 p refs
(Contract F19628-71-C-0073; AF Proj. 6698)
(AD-744098; AFCRL-72-0260) Avail: NTIS CSCL 04/2

Quantitative radiance measurements from NASA's ATS-3 geosynchronous satellite have been used to develop and test a statistical forecast method to predict air terminal weather over the very short range (0-6 hours) time period. Results from more than 800 hourly weather situations at a wide range of U. S. weather stations show that the parameters of ceiling and total opaque cloud cover can be specified or predicted with skill, exceeding persistence forecasts for time periods greater than two hours. Author (GRA)

N72-32636# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OPERATIONAL SYSTEM OF OBJECTIVE ANALYSIS OF GROUND PRESSURE AND BAROMETRIC TENDENCIES FOR A DENSIFIED NETWORK
S. L. Belousov, S. A. Mashkovich, S. M. Sharinova, S. V. Nemchinov, and M. S. Fuks-Rabinovich 31 Mar. 1972 164 p refs Transl. into ENGLISH from Tr. Gidrometeorologicheskii Navchno-Issled. Tsentr SSSR (USSR), no. 54, 1970 p 1-128
(AD-744184; FTD-MT-24-1449-71) Avail: NTIS CSCL 04/2

An analysis is made of some questions of the hydrodynamic theory of general atmospheric circulation and numerical methods for forecasting average periods, and also of questions of the operational application of systems for the processing of data and numerical forecasting. Author (GRA)

N72-32637# Weather Wing (5th), Langley AFB, Va.
THE USE OF WIND STRATIFIED CONDITIONAL CLIMATOLOGY TABLES
Ronald F. Madsen 9 Jun. 1972 18 p refs
(AD-744521; Rept-5WWTN-72-2) Avail: NTIS CSCL 04/2

The paper describes the design of computer produced Wind Stratified Conditional Climatology Tables and their use in short-range forecasting. Author (GRA)

N72-32638# Weather Wing (4th), Ent AFB, Colo.
A COMPARISON OF TWO TECHNIQUES USED TO DEVELOP A COMPUTER GENERATED MAP TYPE CATALOG
Robert C. Sabin and Richard L. Mieman Mar. 1972 27 p refs
(AD-744102; Rept-4WWTP-72-2) Avail: NTIS CSCL 04/2

The 4th Weather Wing has been developing procedures for the incorporation of computer derived weather map types into a terminal forecast system. This requires the production of an area synoptic map type catalog, which would be the basis for a real time computerized analog system. Once the analog correlation is established, the computer could evaluate prestored probability tables and/or objective forecast studies for the occurrence or nonoccurrence of various phenomena. This computer output would provide a valuable first approximation for the local forecast. The forecaster would then accept, reject, or modify the statistical forecast depending upon his appraisal of other available meteorological information. Author (GRA)

21 NAVIGATION

Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also 07 Communications.

N72-32639*# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.
AN ALGORITHM FOR TERMINAL AIR TRAFFIC CONTROL
Alexander H. Sarris and Michael Athans Dec. 1971 40 p refs
(Grants NGL-22-009-124; AF-AFOSR-1941-70)
(NASA-CR-128298; ESL-P-466) Avail: NTIS HC $4.00 CSCL 17G

An area-navigation method for automatic control of aircraft arriving in a random fashion from the en-route centers to the near terminal area is proposed. Control is exercised by a ground computer that sequences and schedules the aircraft. Altitude segregation is used to separate aircraft in velocity classes. Merging of all aircraft occurs near the outer marker. The merging region is designed so that no near misses will occur if the aircraft follow the assigned trajectories. Author

N72-32640# Joint Publications Research Service, Arlington, Va.
HEADING INDICATING AND AUTOMATIC FLIGHT CONTROL SYSTEMS ON AIRPLANES OF THE CIVIL AVIATION SERVICE
N. M. Bogdanchenko, G. Yu. Voloshin, and V. S. Belykh 15 Sep. 1972 304 p refs Transl. into ENGLISH of the book "Kursovyye Sistemy i Navigatsionnyye Avtomaty Samoletov Grazhdanskoy Aviatsii" Moscow, Transport Publishing House, 17 Jun. 1971 268 p
(JPRS-57031) Avail: NTIS HC $17.25

The general principles are presented of the structure and operation of heading indicator systems, astrocompasses and automatic navigation systems. A study is made of the problems of the errors, causes of their occurrence and methods of improving the operating precision of the indicated devices. The problems of the volume, content and procedures of technical servicing and maintenance are discussed. A general procedure is presented for determining the basic reliability characteristics of the devices, and the general principles of technical diagnostics of failures are given. Heading indicator systems, astrocompasses and automatic navigation systems used on civil aircraft are described. Author

N72-32641*# Massachusetts Inst. of Tech., Cambridge. Charles Stark Draper Lab.
GUIDANCE SYSTEM OPERATIONS PLAN FOR MANNED CM EARTH ORBITAL MISSIONS USING PROGRAM SKYLARK 1. SECTION 4: OPERATIONAL MODES
John C. Dunbar May 1972 899 p ref
(Contract NAS9-4065; Proj. Apollo)
(NASA-CR-128544; R-693-Sect-4-Rev-1) Avail: NTIS HC $47.00 CSCL 17G

The operational modes for the guidance system operations plan for Program SKYLARK 1 are presented. The procedures control the guidance and navigation system interfaces with the flight crew and the mission control center. The guidance operational concept is designed to comprise a set of manually initiated programs and functions which may be arranged by the flight crew to implement a large class of flight plans. This concept will permit both a late flight plan definition and a capability for real time flight plan changes. Author

N72-32642# Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.
VOR TACAN LOW ALTITUDE FLIGHT CHECK SUMMARY
Frank Bassett [1972] 42 p
Avail: NTIS HC $4.25

A low altitude flight check to determine the accuracy of

VOR Tacan air navigation aid is discussed. To calculate bearing ergors, eight arbitrary points were used, the four cardinal points and the four semicardinal points. The method used to extract the data and prepare the error summary is described. Charts are included to present the results of the numerical analysis. Author

N72-32643# Federal Aviation Administration, Washington, D.C. Spectrum Analysis Branch.
DOPPLER VOR ELECTROMAGNETIC MEASUREMENTS
Garth M. Kanen 19 Jun. 1972 11 p
(FAA Proj. 213-621)
(TN-6050.23-Add) Avail: NTIS HC $3.00

Electromagnetic measurements of the Doppler VOR navigation system for the Washington, D.C. area are discussed. Measurements were taken at 111.0 Mhz at various distances and elevation angles. The equipment and procedures used to conduct the tests are described. Spectrum photographs are included to present the results of the tests. Author

N72-32644# Massachusetts Inst. of Tech., Cambridge. Flight Transportation Lab.
CONCEPT DEVELOPMENT AND EVALUATION OF AIRBORNE TRAFFIC DISPLAYS Ph.D. Thesis
Thomas Imrich Jun. 1971 105 p refs
(FTL-R71-2) Avail: NTIS HC $7.25

A system concept for a cockpit traffic situation display (TSD) was developed and a preliminary evaluation was undertaken to investigate the effect of a TSD on safety, efficiency, and capacity in the 3rd generation NAS/ARTS ATC system environment. The optimum display configuration, examples of procedural changes, benefits to the pilot, and benefits to ATC are discussed. The test program was conducted in three phases: basic tracking tests, ATC procedural tests, and spacing tests using position command data. Both quantitative and qualitative measures were used for determining safety, pilot and controller workload, and task performance. Pilot response to the TSD as a safety device was strongly favorable. In tasks which involved limited pilot participation in the ATC control process, improvements in spacing accuracy and a decrease in communications at satisfactory pilot workload levels were demonstrated. Author

N72-32645# Mitre Corp., McLean, Va.
CONCEPTS, DESIGN AND DESCRIPTION FOR THE UPGRADED THIRD GENERATION AIR TRAFFIC CONTROL SYSTEM, AS OF JANUARY 1972. CONUS ATC SYSTEM. OCEANIC ATC SYSTEM
Jan. 1972 145 p refs Sponsored by FAA
(AD-743635; FAA-ED-01-1) Avail: NTIS CSCL 17/7

The document presents the concepts and an overall system design which is capable of satisfying specific goals and objectives presently established for the system of the late 1970s and the 1980s. It describes the proposed new features, equipment, and automation now being programmed for development and evaluation. The emphasis is on the bases for the proposed design and the operational implications of the design for both the aircraft operators and pilots and for the air traffic controllers and flight services specialists. Author (GRA)

N72-32646# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
FUNDAMENTAL GEOKINETIC CONSIDERATIONS IN MULTIPLE POSITION GYROCOMPASSING Environmental Research Papers
Thomas S. Rhoades 22 Mar. 1972 19 p refs
(AF Proj. 7628)
(AD-743832; AFCRL-72-0188; AFCRL-ERP-395) Avail: NTIS CSCL 17/7

The inertial process of multiple position gyrocompassing is analyzed to determine performance deviations due to the geokinetic error sources of tilt, tilt rate and polar wobble. Author (GRA)

N72-32647# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF DRY FRICTION FORCES IN THE GYRO GIMBAL JOINT OF THE MOTION OF A FREE GYRO
G. N. Dmitriev and A. A. Potopov 11 Apr. 1972 9 p refs Transl. into ENGLISH from Tr., Aviats. Inst. (Kazan), no. 121, 1970 p 23-28
(AF Proj. 7343)
(AD-744150; FTD-HC-23-142-72) Avail: NTIS CSCL 17/7

A derivation is given of expressions describing the motion of a free gyro of specific design in a static coordinate system in the presence of dry friction in the flexible inner gimbal joint. Particular attention is given to the case of weak damping. The Lagrange method is applied to derive the equations of motion. Author (GRA)

N72-32648# National Bureau of Standards, Washington, D.C.
EXTENSION OF A CAPACITY CONCEPT TO DUAL USE RUNWAYS AND MULTI-RUNWAY CONFIGURATIONS Final Report
W. A. Horn Dec. 1971 113 p refs
(Contract DOT-FA69WAI-166)
(AD-744481; NBS-10593; FAA-RD-71-19) Avail: NTIS CSCL 17/7

The document is based on a previous investigation which yielded a maximum throughput rate concept for the capacity of a facility serving a single stream of customers of various types, in particular a runway serving a stream of landing aircraft. The present study develops four extensions of this concept, of progressively broader scope, to facilities serving several customer-streams. An explicit capacity-formula is derived for each extension. The second extension is applied to a runway serving both landings and takeoffs, while the final extension provides a theoretical basis for evaluating the capacity of complexes of runways at airports. An appendix gives several illustrations of how such results can be used to analyze the enhancement of capacity of appropriate settings of operational parameters. Author (GRA)

N72-32649# Army Aeromedical Research Lab., Fort Rucker, Ala.
DIFFERENTIAL VELOCITY AND TIME PREDICTION OF MOTION
Kent A. Kimball, Mark A. Hofmann, and Richard O. Nossaman Apr. 1972 25 p refs
(DA Proj. 3A0-62110-A-819)
(AD-745119; USAARL-72-14) Avail: NTIS HC $3.25 CSCL 17/7

The effects of differential target velocity, horizontal or vertical plane conditions, and air traffic controller experience were investigated for intersection time estimation accuracy of two converging targets. Accuracy in magnitude and direction was found to vary significantly as a function of cursor speed, with slower speeds producing poorer performance. A differential effect for various speed combinations was also noted. Estimation accuracy on the lowest cursor speed when paired with the two faster speeds was decreased, while accuracy on the intermediate speed was degraded when combined with either slower or faster speeds. Estimations on the fastest speed were not affected by differential pairings. Author

22 NUCLEAR ENGINEERING

Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see 24 Physics, Atomic, Molecular, and Nuclear. For related information see also 03 Auxiliary Systems; and 28 Propulsion Systems.

N72-32650*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CESIUM-DIODE PERFORMANCES FROM THE 1963-TO-1971 THERMIONIC CONVERSION SPECIALIST CONFERENCES
James F. Morris Washington Sep. 1972 53 p
(NASA-TM-X-2589; E-6989) Avail: NTIS HC $3.00 CSCL 10B

Indexes and summaries of the conference papers containing cesium-diode results are presented. Lists of converter materials, geometries, conditions, outputs, and lifetimes accompany the references. Simple chemical designations for emitters, collectors, and additives direct the reader to appropriate selections. Author

N72-32651# Oak Ridge National Lab., Tenn. Thermonuclear Div.
PROSPECTS FOR ALTERNATE FUSION FUEL CYCLES AT ULTRA-HIGH TEMPERATURES
J. Rand McNally, Jr. Apr. 1972 20 p refs
(Contract W-7405-eng-26)
(ORNL-TM-3783) Avail: NTIS

Recent experiments and theory give support to the idea of developing a closed magnetic mirror by the self-field of a trapped ring current. Since the mirror reactor may be able to operate at much higher burning temperatures than toroidal reactors, the viability of charged-particle fusion chain reactions is thereby increased and may permit the chain reaction burning of cheap Li or Be nuclear fuel. Reaction kinetics studies in partially closed mirrors show MeV energies for the light fusion reaction products which can act as catalysts or chain centers for the propagation of such reactions. The MeV particles may also permit sustainment of both the ring-current configuration and the burning temperature. Numerous problem areas associated with this approach are tabulated. Author (NSA)

23 PHYSICS, GENERAL

Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics; 20 Meteorology; and 29 Space Radiation.

N72-32652*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AMORPHOUS MAGNETISM IN fcc VICALLOY 2
James P. Cusick, G. Bambakidis, and Lawrence C. Becker 1972 13 p refs Presented at Intern. Symp. on Amorphous Magnetism, Detroit, 17-18 Aug. 1972
(NASA-TM-X-68127; E-7099) Avail: NTIS HC $3.00 CSCL 20C

The results of magnetization and Mossbauer experiments are reported which give evidence for superparamagnetism in the quenched face centered cubic (gamma) phase of the ternary system Fe(0.34)C(0.52)V(0.14) (Vicalloy 2). while the magnetization data agree with the limited data of Nesbitt et al., this more complete study shows clearly that this alloy does not acquire long-range ferromagnetic order, nor does it indicate either antiferromagnetic long-range ordering or micromagnetic behavior, down to 4.2 K. The data can best be described as resulting from ferromagnetic clusters in a weakly magnetic lattice. The Mossbauer data show a slightly broadened single line spectrum of 300 K which broadens with decreasing temperature without development of resolvable hyperfine splitting down to 4.2 K. The broadening is attributed to relaxation effects associated with magnetic cluster coalescence. Author

N72-32653# Joint Publications Research Service, Arlington, Va.
TABLE OF CONTENTS AND FOREWORD OF A BOOK ON INFRARED FILTERS
N. A. Borisevich, V. G. Vereshchagin, and M. A. Validov 30 Aug. 1972 5 p Transl. into ENGLISH from the book "Infrakrasnyye Filtry" Minsk, 1971 p 3-4, 230-231
(JPRS-56916) Avail: NTIS HC $3.00

Principles involved in the operation of various types of infrared filters are examined, along with their spectral characteristics, and certain structural peculiarities. Each of the six chapters describes a different type of filter including reflecting, absorbent, interference, diffusion dispersion and combination filters. Author

N72-32654*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THEORETICAL AND OBSERVATIONAL ANALYSIS OF SPACECRAFT FIELDS
F. M. Neubauer and K. H. Schatten Sep. 1972 23 p refs Sumitted for publication
(NASA-TM-X-66036; X-692-72-300) Avail: NTIS HC $3.25 CSCL 20C

In order to investigate the nondipolar contributions of spacecraft magnetic fields a simple magnetic field model is proposed. This model consists of randomly oriented dipoles in a given volume. Two sets of formulas are presented which give the rms-multipole field components, for isotropic orientations of the dipoles at given positions and for isotropic orientations of the dipoles distributed uniformly throughout a cube or sphere. The statistical results for an 8 cu m cube together with individual examples computed numerically show the following features: Beyond about 2 to 3 m distance from the center of the cube, the field is dominated by an equivalent dipole. The magnitude of the magnetic moment of the dipolar part is approximated by an expression for equal magnetic moments or generally by the Pythagorean sum of the dipole moments. The radial component is generally greater than either of the transverse components for the dipole portion as well as for the nondipolar field contributions. Author

N72-32655# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
SCATTERING OF ACOUSTIC WAVES BY A SPHERICAL INCLUSION IN A SOLID
T. C. Fang Sep. 1972 62 p refs
(RE-440) Avail: NTIS HC $5.25

An analysis is presented of surface deformation and scattered energy due to scattering of a high frequency plane longitudinal wave by a spherical inclusion in an isotropically elastic solid medium. The inclusion is taken to be an isotropically elastic sphere of different material or a spherical cavity. The average rate of total scattered energy was derived in terms of the expansion coefficients of the scattering waves. Exact and approximate, for both Rayleigh scattering and finite small inclusion, expressions for the expansion coefficients were obtained. Numerical results show that if the ratio of the cavity circumference to the sound wavelength is not greater than unity, the first three expansion coefficients will be sufficient to give a fair result with less than 5 percent error. The free surface deformation of an ideal fluid layer atop the testing elastic solid due to scattering and incoming longitudinal wave is deduced as a function of the location and the size of the inclusion. Author

N72-32656# Lockheed Missiles and Space Co., Palo Alto, Calif.
COMPUTATION OF THE OPERATING RANGE OF NIGHT VISION DEVICES
S. A. Sukhoparov [1972] 4 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Priborostr. (USSR), v. 15, no. 6, 1972 p 102-105
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

A method of computing the operating range of active night vision devices is presented. A computation formula is derived which permits calculation of the operating range of active night vision devices by means of known structural parameters of the device, the characteristics of the lighting unit, and accounting for

the spectral transmission of the atmosphere, the influence of the resolving power of the device in conjuction with the eye, and the contrast of the image. Author

N72-32657# Kyoto Univ. (Japan). Research Inst. for Fundamental Physics.
ON TREDERS INTERPRETATION OF EINSTEINS UNIFIED FIELD THEORY
Klaus Buchner Jun. 1972 7 p refs
(RIFP-154) Avail: NTIS HC $3.00

To solve some of the difficulties arising from Einstein's theory, Treder interpreted the theory as equations for a spin 1/2 particle. The two-component Weyl-spinor entered via a given ansatz which lead to an understanding of some exact solutions. The same ansatz is applied to another exact solution (Buchner's), and the new problems involved with the charged Weyl-spinors are briefly discussed. N.E.N.

N72-32658*# National Aeronautics and Space Administration, Washington, D.C.
PHYSICAL AND TECHNOLOGICAL CONDITIONS OF MODELING ACOUSTICAL FIELDS IN ARCHITECTURAL ACOUSTICS
Zdener Kesner Feb. 1972 25 p refs Transl. into ENGLISH from Slaboproudy Obz. (Czechoslovakia), v. 31, no. 1, 1970 p 18-24
(NASA-TT-F-14466) Avail: NTIS HC $3.25 CSCL 20A

The physical and technological agreement conditions between the model and the original acoustic field are considered. The effect of individual factors on the accuracy of the results and on the choice of the model scale is discussed. The main limitation is the frequency-dependent absorption of ultrasonic waves propagating in the air, from the point of view of the measuring apparatus, electroacoustical transducers present the most challenging problems. It was determined that the modeling of absorbing materials can be accomplished with satisfactory accuracy. Author

N72-32659# Bureau of Mines, Minneapolis, Minn. Twin Cities Metallurgy Research Center.
PREPARING MAGNETIC FLUIDS BY A PEPTIZING METHOD
G. W. Reimers and S. E. Khalafalla Sep. 1972 16 p refs
(BM-TPR-59) Avail: NTIS HC $3.00

Agglomeration from matter in the molecular state, rather than long term grinding and dispersion techniques, was used to prepare magnetic colloids. Under optimum conditions, freshly precipitated iron (II and III) hydrous oxides in an aqueous phase can be extracted into an immiscible hydrocarbon phase by means of a transfer agent. Steric stabilization of the colloidal magnetic particles was accomplished by a suitable peptizing agent which also acted as a dispersing agent. Rapid preparation of large volumes of magnetic fluids at a substantial saving in cost was accomplished by the peptization technique. Author

N72-32660*# Scientific Translation Service, Santa Barbara, Calif.
ACOUSTIC WAVE EXCITATION IN A FLAME
M. Fitaire and D. Sinitean Washington NASA Oct. 1972 6 p refs Transl. into ENGLISH from Czech. J. Phys., Sect. B (Prague), v. B22, no. 5, 1972 p 394-397
(Contract NASw-2035)
(NASA-TT-F-14594) Avail: NTIS HC $3.00 CSCL 20A

Acoustic waves were excited in a flame seeded with potassium. It is shown that the amplitude of the excited wave is proportional to the frequency of a harmonic perturabtion imposed on the plasma. This suggests a means of ultrasonic excitation, the limitations of which are analyzed. Author

N72-32661# Rutherford High Energy Lab., Chilton (England).
TOWARDS THE DESIGN OF SUPERCONDUCTING MAGNETS FOR A PROTON SYNCHROTRON
J. H. Coupland Feb. 1972 12 p refs Presented at the 3d Intern. Conf. on Magnet Technol., Hamburg, 19 May 1970
(RPP/A-88; CONF-700503-12) Avail: AEC Depository Libraries

Formulas for calculating the complete flux pattern of a thick coil surrounded by an iron shield are given. Both theoretical and practical aspects of the design of possible coil windings are considered. Magnets must have fields around 60 kG with no more than 0.1% variation, and maintain their quality despite thermal, vacuum, and magnetic stresses. Author (NSA)

N72-32662# SACLANT ASW Research Center, La Spezia (Italy).
AN EXPANSION TECHNIQUE FOR RENDERING THE WKBJ METHOD UNIFORMLY VALID
Vetle R. Lauvstad 15 Dec. 1971 41 p refs
(AD-742465; SACLANTCEN-TR-203) Avail: NTIS CSCL 20/1

A method is proposed for obtaining a uniformly valid approximation to the solution of the wave equation in a stratified medium. The method differs from those previously used in that it is not based on ordinary asymptotic expansions but employs a multiple scale approach together with matched asymptotic expansions. The method represents an advance over conventional methods in permitting its range of validity to include transition points. It also, in principle, lends itself particularly well to iteration. For illustration the procedure has been applied to the barrier transmission problem and the problem of trapped wave modes in a SOFAR channel. Author (GRA)

N72-32663# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MULTIPLE-USE SUBSONIC WAVES
Hsieh-Shan Wang 4 Jan. 1972 9 p Transl. into ENGLISH from K'o Hsueh Ta Chung (China), no. 9, 1964 p 348-349
(AD-743828; FTD-HT-23-971-71) Avail: NTIS CSCL 20/1

The report reviews the applications of ultrasonic radiation detection to fields of seismic detection, geophysics, underwater communications, storm forecasting, non-destructive testing, agriculture and medicine. GRA

N72-32664# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ANALYSIS OF PROPAGATION IN SPACE-TIME MODULATED MEDIA USING MANY-SPACE SCALE PERTURBATION THEORY
Ronald L. Fante 22 Mar. 1972 47 p refs
(AF Proj. 5635)
(AD-743861; AFCRL-72-0187; AFCRL-PSRP-482) Avail: NTIS CSCL 20/14

The coupled-mode equations for propagation in a medium modulated by a multiple-frequency traveling wave have been studied using many-space-scale perturbation methods. It is shown that the coupled modes propagate differently on different space scales, and that conditions for resonant coupling between modes are simply obtained by requiring no secular behavior of an asymptotic expansion for the forward and backward wave amplitudes. These principles are then illustrated by calculating the fields in a modulated half-space and in a finite slab.
Author (GRA)

N72-32665# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CLASSIFICATION FEATURES OF THE FORMS OF THE APPEARANCE OF ELECTRICAL EROSION
K. K. Namitokov 21 Mar. 1972 17 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Elektromekhan. (Novocherkassk), no. 3, 1970 p 279-284
(AD-744155; FTD-HT-23-1196-71) Avail: NTIS CSCL 20/3

The following types of erosions are classified and discussed: electrical erosion, break-contact erosion, make contact erosion, electrically explosive erosion, contactless erosion, gas-discharge erosion, plasma erosion, erosion in arc discharges, erosion in

glow discharges, erosion in spark discharges, and erosion in pulsed-arc discharges. GRA

N72-32666# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE FABRY-PEROT INTERFEROMETER AND SOME APPLICATIONS OF IT IN SPECTROSCOPY
N. I. Kaliteevskii and M. P. Chayka 31 Mar. 1972 81 p refs Transl. into ENGLISH from the publ. "Spektroskopiya Gazorazryadnov Plazmy" Leningrad, Nauka, 1970 p 160-200
(AF Proj. 7073)
(AD-744174; FTD-MT-24-1234-71) Avail: NTIS CSCL 20/6

A detailed summary of the theory underlying a Fabry-Perot interferometer with parallel mirrors was given. Sources of error in the measurements were discussed, and several variations of interferometer design were evaluated. A photoelectronic method for recording the interference fringes is discussed. Various combinations of the interferometer with a spectrography for studying spectral lines were discussed and evaluated. Applications to the measurement of the relative intensities and splittings of the components of a spectral line were reviewed, as well as methods for determining the contour of a spectral line. The use of an interferometer as a filter for optical pumping was evaluated. Author (GRA)

N72-32667# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTEGRAL AND BEAM EMISSION FROM TUNGSTEN, CAUSED BY RADIATION OF A RUBY LASER
U. A. Arifov, V. V. Kazanskii, V. B. Lugovskoi, and V. V. Markarenko 21 Mar. 1972 11 p ref Transl. into ENGLISH from Izv. Akad. Nauk Uz. SSR, Ser. Fiz. Mat. Nauk (Tashkent), v. 14, no. 2, 1970 p 81-84
(AD-744285; FTD-MT-24-1819-71) Avail: NTIS CSCL 20/3

The integral emission of a target subjected to irradiation by a ruby laser beam was investigated with a W target by a previously described method (1968). The integral emission is suitable described by the thermal conductivity theory and by the Richardson equation. Author (GRA)

N72-32668# Hughes Research Labs., Malibu, Calif.
RESEARCH IN INTERACTION OF COHERENT LIGHT WITH SOLIDS AND WITH TURBULENT ATMOSPHERES Final Report
Wilbur P. Brown, Jr. May 1972 118 p refs
(Contract F44620-71-C-0048; AF Proj. 9768)
(AD-744122; AFOSR-72-1188TR) Avail: NTIS CSCL 20/6

The report summarizes the objectives and results of research on propagation in random media conducted under the contract. The principal results include the numerical solution of the partial-differential equation for the fourth moment of a two-dimensional plane wave propagating in a random medium and the preparation of an extensive discussion of the applications of multiple-scattering theories in the analysis of the effects of atmospheric turbulence in radar, imaging, communication, and detection systems. Author (GRA)

N72-32669# California Inst. of Tech., Pasadena.
INTERACTION OF RADIATION AND MATTER Final Report, 25 Jun. 1968 - 31 Dec. 1971
Amnon Yariv 1972 43 p refs
(Contract DAHC04-68-C-0041)
(AD-744500; AROD-7893-11-P) Avail: NTIS CSCL 20/6

The report contains a summarization of the following efforts: Propagation through turbulent atmospheres in which a new method for obtaining exact analytical expressions for some statistical functions of an optical wave propagating through a randomly turbulent medium was obtained; Nonlinear optics statistics in which the necessary quantum field formalism needed to evaluate the average number of photons in the various modes as well as their variances was developed; Cadmium telluride as a window and electrooptical material in which the electrooptic properties and the optical losses of CdTe were measured; Electrooptic control in integrated optics; Phenomena in High Gain Lasers; and Mode Locking by Kerr (Optically Nonlinear) Liquids. Author (GRA)

N72-32670# School of Aerospace Medicine, Brooks AFB, Tex.
CONVERSION OF OCTAVE BAND NOISE DATA TO EQUIVALENT A-WEIGHTED LEVELS Progress Report, Nov. 1970 - Sep. 1971
Donald C. Gasaway Dec. 1971 17 p refs
(AF Proj. 7755)
(AD-744522; SAM-TR-71-45) Avail: NTIS CSCL 20/1

Bioacoustic criteria incorporating A-weighted sound levels have been widely adopted in industry and government; yet much of the noise data currently stored or in use by the Air Force is expressed in octave bands. The Air Force is finding it increasingly necessary to convert these data to equivalent A-weighted values. This report describes and illustrates a simple device--a dial-type calculator--with which such conversion can be made. Five different A-weighted conversions are provided: two for data expressed in the old octave bands, and three for data expressed in the newer set (preferred) of octave bands. Author (GRA)

24 PHYSICS, ATOMIC, MOLECULAR, AND NUCLEAR

Includes atomic, molecular, and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

N72-32671# Maryland Univ., College Park. Center for Theoretical Physics.
ASYMPTOTIC ALGEBRAIC REALIZATION OF SU(3), BARYON CLASSIFICATION, g SUB A)(0) AND D/F RATIO
S. Oneda and Seisaku Matsuda (Polytechnic Inst. of Brooklyn) Dec. 1971 10 p refs
(Grants NSF GP-8748; NSF GU-2061)
(TR-72-065) Avail: NTIS HC $3.00

In the framework of the chiral direct product of SU(3) and SU(3) charge algebra, a scheme of asymptotic algebraic realization of SU(3) is proposed. The scheme requires a certain grouping of baryon states in the asymptotic limit. For the axial-vector couplings, it yields D/F = 3/2 but (g sub A)(0) = (5/3)(sq root of f), f being the universal fractional contribution (approximately 50%) to the sum rules coming from the ground state baryons. Neither the assumption of saturation by low lying states nor the introduction of large configuration mixing is necessary. For the ground state baryons, the (56, n=L=0) classification of the direct product of SU(6) and O(3) is consistent with the scheme. Author

N72-32672# Loughborough Univ. of Technology (England). Dept. of Chemical Engineering.
RESEARCH REPORT OF THE PARTICLE TECHNOLOGY GROUP, 1969 - 1970
[1971] 156 p refs
Avail: NTIS HC $10.00

The research in particle technology in reported. Summaries of the projects reported are grouped as follow: particle characterization, particle-particle interaction, particle-fluid systems, and particle production. F.O.S.

N72-32673*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRUCTURE OF ZIRCONIUM-93 AND ZIRCONIUM-91 AS SHOWN BY THE REACTIONS Zr-92(d,p)Zr-93 AND Zr-92(d,t)Zr-91

Norton Baron, Regis F. Leonard, William M. Stewart, Charles L. Fink (Argonne National Lab.), Per Rex Christensen (Niels Bohr Inst.), Jerry Nickles (Wisconsin Univ.), and Tor F. Thorsteinsen (Bergen Univ.) Washington Sep. 1972 59 p refs
(NASA-TN-D-6911; E-6738) Avail: NTIS HC $3.00 CSCL 20H

Deuterons of 13-MeV incident energy were scattered from Zr-92(d,p)Zr-93. The Zr-92(d,p)Zr-93 data analysis resulted in the location of 47 levels up to an excitation energy of 4.84 MeV, and the spins of 43 of these levels were identified. Essentially all the strength of the 2d5/2, 3s1/2, 2d3/2, and 1g7/2 shells was observed; and the excitation energy of their centroids was computed to be 0.00, 1.21, 2.23, and 2.37 MeV, respectively. Also, 43 percent of the 1h11/2 strength, 21 percent of the 2f7/2 strength, and 3 percent of the 3p3/2 strength were observed. In addition, the Zr-92(d,t)Zr-91 data analysis resulted in the location of 26 levels up to an excitation energy of 4.01 MeV, and the spins of 21 of these levels were identified. Most of the expected strength of the 2d5/2 and 1g9/2 shells was obtained, and the excitation energy of their centroids was computed to be 0.31 and 3.19 MeV, respectively. In addition, six l=1 states are populated belonging to either the 2p1/2 or 2p3/2 shells. Author

N72-32674# Maryland Univ., College Park. Center for Theoretical Physics.
SPONTANEOUSLY BROKEN WEAK AND ELECTROMAGNETIC INTERACTION SYMMETRY AND THREE TRIPLET MODEL FOR HADRONS
Rabindra N. Mohapatra Aug. 1972 12 p refs
(Grant NSF GP-8748)
(TR-72-022) Avail: NTIS HC $3.00

The hadronic part of the Glashow-Georgi theory of weak and electromagnetic interactions is modified using three triplet model. Author

N72-32675# Maryland Univ., College Park. Center for Theoretical Physics.
DIAGONAL STRUCTURE OF THE S MATRIX IN THE LEE MODEL
O. W. Greenberg and H. Yabuki Aug. 1972 40 p refs
(Grant NSF GP-8748)
(TR-73-023) Avail: NTIS HC $4.00

The N2 theta- and N3 theta-type eigenvalues are shown to factor exactly into the products of the corresponding N theta eigenvalues, and it follows that these eigenvalues are free of production thresholds. The (implicit) eigenvalue equation for the V2 theta-type eigenvalue is given, and this eigenvalue is shown to factor asymptotically with the product of the corresponding V theta eigenvalues. These properties are conjectured to hold for Nj theta- and Vj theta-type eigenvalues. It is conjectured that the two-body type eigenphase operator gives the dominant contribution to the S-matrix at high energy. Author

N72-32676*# National Aeronautics and Space Administration, Washington, D.C.
QUANTUM THEORY OF THE GLOWING ELECTRON, 1
A. A. Sokolov and I. M. Ternov Jun. 1972 19 p refs Transl. into ENGLISH from Zh. Eksperim. Teor. Fiz. (Moscow), v. 23, 1952 p 632
(NASA-TT-F-14450) Avail: NTIS HC $3.00 CSCL 20H

The approximate quantum theory of the radiation of fast electrons moving in a magnetic field is considered. The conditions of the appearance of quantum correction of the order of n sq/l are investigated, where n is the number of the radiated harmonic and l is the azimuthal quantum number. It is shown that these corrections contract when the total radiation intensity is calculated. Quantum corrections of the order of n sq/l remain in the total intensity. The total radiation intensity for transitions between circular and noncircular orbits is determined, and problems connected with the transitions are examined in detail. Author

N72-32677*# National Aeronautics and Space Administration, Washington, D.C.
QUANTUM THEORY OF THE GLOWING ELECTRON, 2
A. A. Sokolov, N. P. Klepikov, and I. M. Ternov Jun. 1972 8 p refs Transl. into ENGLISH from Zh. Eksperim. Teor. Fiz. (Moscow), v. 24, 1953 p 249
(NASA-TT-F-14451) Avail: NTIS HC $3.00 CSCL 20H

The order of the quantum corrections to the total radiation intensity of the electron is found, and the value is calculated. The total radiation intensity is found only on the assumption that n/l is much smaller than 1. The asymptotic approximation of matrix element I (l', l) is found for values of x which correspond to the radiation maximum. Author

N72-32678*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEFORMED BRUECKNER-HARTREE-FOCK CALCULATIONS
W. F. Ford, R. C. Braley, R. L. Becker (ORNL), and M. R. Patterson (ORNL) 1972 31 p refs Presented at the Symp. on Present Status and Novel Develop. in the Many Body Probl., Rome, 19-23 Sep. 1972
(NASA-TM-X-68134) Avail: NTIS HC $3.75 CSCL 20H

The renormalized Brueckner-Hartree-Fock (RBHF) theory for many-body nuclear systems is generalized to permit calculations for intrinsic states having permanent deformation. Both Hartree-Fock and Brueckner self-consistencies are satisfied, and details of the numerical techniques are discussed. The Hamada-Johnston interaction is used in a study of deformations, binding, size, and separation energies for several nuclei. Electromagnetic transition rates, moments, and electron scattering form factors are calculated using nuclear wave functions obtained by angular momentum projection. Comparison is made to experiment as well as to predictions of ordinary and density-dependent Hartree-Fock Theory. Author

N72-32679*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
COMPARISON OF EXACT AND APPROXIMATE EVALUATIONS OF THE SINGLE-SCATTERING INTEGRAL IN NUCLEON-DEUTERON ELASTIC SCATTERING
John W. Wilson Washington Oct. 1972 20 p refs
(NASA-TN-D-6884; L-8369) Avail: NTIS HC $3.00 CSCL 20H

The exact nucleon-deuteron elastic single scattering integral was calculated numerically in order to evaluate errors in sticking factor approximations. A similar analysis made by using S wave separable potentials concluded that errors for these approximations were negligible except near backward angles where they were found to be about 10 percent. Author

N72-32680*# National Aeronautics and Space Administration, Washington, D.C.
EXCITATION OF ATOMS BY ELECTRON IMPACTS, AS APPLIED TO THE EXCITATION OF RESONANCE TRANSITIONS IN THE ISOELECTRONIC SERIES OF LITHIUM AND SODIUM
O. Bely, J. A. Tully, and H. VanRegemorter Jun. 1972 45 p refs Transl. into ENGLISH from Ann. Phys. (Paris), v. 8, Ser. 13, Jul.-Aug. 1963 p 303-321
(NASA-TT-F-14430) Avail: NTIS HC $4.25 CSCL 20H

The methods of computing excitation cross sections of neutral atoms and positive ions by electron impact are considered. The theory of Racah tensor operators was applied to the calculation of potentials taking part in collision problems. The application of the method was discussed for cross section computation in the case of resonance transitions in the isoelectronic lithium and sodium series. The results from these approximations were compared to those obtained using the method of solving coupled equation problems, as well as the method of Bethe and collision impact parameter approximations. It was confirmed that the impacts corresponding to large kinetic moments are predominant, with the exception of areas close to the excitation threshold. K.P.D.

N72-32681*# National Aeronautics and Space Administration, Washington, D.C.
THEORY OF SCATTERING OF FAST CHARGED PARTICLES. 3: MULTIPLE SCATTERING OF TRACKS AND THE INFLUENCE OF STATISTICAL COUPLING
Gert. Moliere Jun. 1972 145 p Transl. into ENGLISH from Z. Naturforsch. (Tubingen), v. 10A, no. 3, 1955 p 177-211
(NASA-TT-F-14426) Avail: NTIS HC $9.25 CSCL 20H

Multiple scattering of a track is treated by dividing the track in sections and measuring certain characteristics which determine the change in direction from cell to cell. The characteristics chosen are chords or angle between neighboring tangents.
Author

N72-32682*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DIVERGENCE OF THE TOTAL CROSS SECTION FOR THREE BODY REARRANGEMENT COLLISIONS WITH COULOMB INTERACTIONS
K. Omidvar Sep. 1972 7 p refs Submitted for publication
(NASA-TM-X-66054; X-641-72-361) Avail: NTIS HC $3.00 CSCL 20H

Three charged particles 1, 2, 3 collide according to the reaction 1+(2+3) yields (1+3)+2, where (2+3) and (1+3) are hydrogenlike bound states. It is shown when (1+3) is in a highly excited state n, due to the repulsive potential, the cross section in the first Born approximation behaves as 1/n which makes the total cross section to diverge like ln n. The total cross sections in the higher orders of the Born approximation are similarly divergent logarithmically.
Author

N72-32683*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOW ENERGY ELECTRON EXPERIMENT FOR AE-C AND AE-D
R. A. Hoffman, J. L. Burch, R. W. Janetzke, J. F. McChesney, S. H. Way, and D. S. Evans (NOAA, Boulder, Colo.) Sep. 1972 26 p refs Submitted for publication
(NASA-TM-X-66051; X-646-72-348) Avail: NTIS HC $3.50 CSCL 20H

The low energy electron experiment (LEE) will provide differential measurements of the energy influx and angular distributions of electrons and protons on the Atmosphere Explorer C and D missions. The detectors consist of cylindrical electrostatic analyzers for species and energy selection and Spiraltron electron multipliers as particle sensors. The C version will contain three detectors measuring the two species from 0.2 to 25 keV in 16 logarithmically spaced steps, and 5 keV electrons continuously. Angular distributions will be acquired utilizing the spin of the spacecraft. The D version will contain 19 detectors, one proton stepped energy analyzer and two electron stepped energy analyzers at two different angles, again over the energy range 0.2 to 2.5 keV. In addition it will contain 16 fixed energy detectors which will obtain high-time-resolution angular distributions in the spacecraft 1 RPO mode at 5 energies between 0.2 and 5 keV. Increase of these energies by a factor of 3.5 will be possible by ground command.
Author

N72-32684# Academy of Sciences of the Armenian SSR, Erevan (USSR). Inst. of Physics.
ON THE POSSIBILITY OF THE CHARGED-PARTICLE TRACK DRIFT COMPENSATION IN THE WIDE GAP SPARK CHAMBER
K. M. Avakyan, R. B. Aivazyan, and E. M. Matevosyan 1971 11 p refs In RUSSIAN; ENGLISH summary
(EFI-ME-1(71)) Avail: AEC Depository Libraries

The method of supplying a wide gas spark chamber with high voltage RF pulses was realized. It is shown that in an alternating field the spark track displacement from the true trajectory of the charged particle due to avalanche drift is absent. An HV generator supplying the RF pulse from 3 to 5 Mc is described.
Author (NSA)

N72-32685# International Centre for Theoretical Physics, Trieste (Italy).
[SOLID STATE, PLASMA, AND HIGH ENERGY PHYSICS RESEARCH] Annual Report, 1970
May 1971 72 p refs
(NP-19250; AR-6) Avail: AEC Depository Libraries

Brief discussions of research work carried out during 1970 are given for the fields of solid state, plasma, and high energy physics. The plasma work centered on instabilities and wave kinetics in toroidal geometries. High energy physics work concentrated on the following: (1) nonlinear realizations of the quantization of nonpolynomial Lagrangians, (2) Regge poles and duality, (3) interactions of high energy particles with nuclei, (4) low energy scattering, and (5) current algebra, chiral symmetry, and scale invariance. Preprints and reports issued during 1970 are listed.
NSA

N72-32686# Institute of Nuclear Research, Warsaw (Poland).
RADIAL DENSITY DISTRIBUTION OF THE FLUX OF CHARGED PARTICLES IN EXTENSIVE AIR SHOWERS
Jerzy Gawin, Juliusz Hibner, Janusz Kempa, and Zofia Piotrowska 1971 24 p refs In POLISH; ENGLISH summary
(INR-1345) Avail: AEC Depository Libraries

Three methods were used to characterize the radial distribution of the charged-particle flux in EAS. Two methods show that in the central part of a shower, the value of the age parameter s is smaller than the generally accepted value (s = 1.25) and is, in fact, about 1.0 to 1.1. The third method shows the value of the s parameter to be s = 1.0 to 1.1 for the central part.
Author (NSA)

N72-32687# Oak Ridge National Lab., Tenn. Thermonuclear Div.
ENERGETIC PARTICLE BEAMS AND FUSION DEVICES
H. K. Forsen (Wis. Univ., Madison), L. D. Stewart, and W. L. Stirling Apr. 1972 15 p refs
(Contract W-7405-eng-26)
(ORNL-TM-3788) Avail: NTIS

Energetic neutral beams are considered both for filling and heating fusion devices. Rough estimates of beam current and energy were derived for open and closed magnetic geometries. In addition, the use of beams to effect energy multiplication schemes or stationary Tokamak experiments are briefly summarized. The problems of neutral beam production as a function of beam energy and ion species is also discussed. The state-of-the-art for ion beam production at Oak Ridge is presented.
Author

25 PHYSICS, PLASMA

Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

N72-32688* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COAXIAL HIGH DENSITY, HYPERVELOCITY PLASMA GENERATOR AND ACCELERATOR WITH IONIZABLE METAL DISC Patent
Patrick N. Espy, Inventor (to NASA) Issued 19 Sep. 1972 6 p Filed 31 Dec. 1970 Supersedes N72-20689 (10 - 11, p 1509)
(NASA-Case-MFS-20589; US-Patent-3,693,002;
US-Patent-Appl-SN-103077; US-Patent-Class-313-231;
US-Patent Class-315-111) Avail: US Patent Office CSCL 20I

A coaxial, high density, hypervelocity plasma generating and accelerating device is described which has a tubular outer electrode and a rod-like central electrode. A foil disc mounted over the central electrode extends radially outward to the outer electrode to bridge the electrode gap and form a shorting path. A capacitor bank is connected across the electrodes, and it discharges through and ionizes the foil disk to produce a dense

plasma or ionized particles. The plasma is accelerated by the electrical and magnetic fields set up when a potential is applied to the electrodes of the device.
Official Gazette of the U.S. Patent Office

N72-32689*# Rensselaer Polytechnic Inst., Troy, N.Y. Electrophysics and Electronic Engineering Div.
INSTABILITIES AND TURBULENCE IN HIGHLY IONIZED PLASMAS IN A MAGNETIC FIELD Final Report, 1 Mar. 1970 - 30 Apr. 1972
W. C. Jennings Aug. 1972 34 p refs
(Grant NGR-33-018-137)
(NASA-CR-128297) Avail: NTIS HC $3.75 CSCL 20I

Physical mechanisms were considered which are responsible for plasma turbulence and the establishment of necessary conditions for energy exchange and transfer in the frequency spectrum. In addition, work was performed to better understand the drift instability in the highly inhomogeneous Rensselaer arc, and methods to suppress this instability using feedback stabilization techniques. Correlation techniques were refined to study plasma turbulence, the diffusion wave technique for monitoring cross-field diffusion was extended to include regimes of high turbulence levels, and a technique for coupling stabilizing RF power to the Rensselaer arc was developed. Author

N72-32690*# Alabama Univ., Huntsville. Div. of Graduate Programs and Research.
STUDY OF DENSE ALUMINUM PLASMAS Final Report
F. C. Todd 31 Mar. 1972 75 p
(Contracts NAS8-25055; NAS8-26773)
(NASA-CR-123830) Avail: NTIS HC $5.75 CSCL 20E

Studies directed toward the development of a computer program describing the penetration of a thin aluminum plate by a quartz sphere are reported. The aluminum simulates a bumper plate for micrometeoroids. The ablation of a rock sphere by penetrating a stack of paper sheets is described, and an equation for losses near the surface of the sphere is derived. The expansions of aluminum plasma sphere with initial energies of 44.45, 20.8, and 7.136 eV are investigated, including shock compression during penetration and adiabatic expansion. The equations of state were derived for aluminum and quartz, as well as one of the Mie-Grunesen type. A technique to determine momentum at the bottom surface of the thin plate, and the energy for hypervelocity separation of fragments of the aluminum plate are also considered. N.E.N.

N72-32691*# Plasmadyne Corp., Santa Ana, Calif.
QUASI-STEADY PLASMA ACCELERATORS
Adriano C. Ducati Jun. 1972 47 p refs
(Contract NAS1-10630)
(NASA-CR-112144; FR-062-10630) Avail: NTIS HC $4.50 CSCL 20I

Results are reported from a continued study of MPD thrusters operating in the quasi-steady mode and using electrode vapor as the propellant. Testing methods were refined, and performance data is now available for a fairly wide range of thruster geometries. Performance was found to be strongly dependent on thruster geometry, with some designs showing approximately twice the efficiency obtained during the preceding contract period. The radial clearance between electrodes, the attachment point of the arc on the cathode, and the electrical resistance of the electrodes appear to be important design variables. Author

N72-32692*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A COMPARATIVE STUDY OF ELECTRICAL PROBE TECHNIQUES FOR PLASMA DIAGNOSTICS
Edward P. Szuszczewicz Jul. 1972 28 p refs Presented at the Sub-LF Downlink Satellite Commun. Conf., Washington, D. C., 6-9 Jun. 1972
(NASA-TM-X-66014; X-625-72-220) Avail: NTIS HC $3.50 CSCL 20I

Techniques for using electrical probes for plasma diagnostics are reviewed. Specific consideration is given to the simple Langmuir probe, the symmetric double probe of Johnson and Malter, the variable-area probe of Fetz and Oeschsner, and a floating probe technique. The advantages and disadvantages of each technique are discussed. F.O.S.

N72-32693*# Techtran Corp., Glen Burnie, Md.
THERMAL CAPACITY OF A WALL WITH A TOROIDAL PLASMA INCULSION
R. Krichel, H. Druxes, and G. Schmitz Washington NASA Sep. 1972 10 p refs Transl. into ENGLISH from Z. Physik (Berlin), v. 248, 1971 p 13-21
(Contract NASw-2037)
(NASA-TT-F-14367) Avail: NTIS HC $3.00 CSCL 20I

A model theory is demonstrated to determine the load capacity of a wall enclosing an electric arc. The theory is based on exact numerical computation of the temperature distribution inside the wall of a toroidal arc tube. It is shown that the thermal load capacity increases with the radius of curvature both and decreases with tube radius, at a fixed radius of curvature.
Author

N72-32694# Nagoya Univ. (Japan). Inst. of Plasma Physics.
CHARACTERISTIC OSCILLATIONS OF A SHEET PLASMA
Tsuguhiro Watanabe and Tadatsugu Hatori Jul. 1972 17 p refs
(IPPT-132) Avail: NTIS HC $3.00

An integral equation is derived for the characteristic oscillations of a sheet plasma whose width is of the order of the ion Larmor radius width. This equation is solved numerically and it is shown that there exist characteristic oscillations with a frequency near the ion cyclotron frequency even for high density plasmas. Author

N72-32695*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION HEATING MECHANISM IN A MODIFIED PENNING DISCHARGE
J. Reece Roth Washington Sep. 1972 87 p refs
(NASA-TN-D-6985; E-7003) Avail: NTIS HC $3.00 CSCL 20I

Ions with Maxwellian energy distributions and kinetic temperatures ranging from 20 eV to 7 keV have been observed in a modified Penning discharge operating in the steady state. Investigation of the plasma revealed two distinct spoke-like concentrations of charge rotating with different velocities in the sheath between the plasma and the anode ring. The faster spoke consists of electrons rotating with the E/B drift velocity, where E is the electric field and B is the magnetic field strength. The slow spoke consists of ions, the thermal velocity of which is observed to be proportional to the spoke velocity. The experimental data are consistent with a model whereby the ion drift velocity in this spoke, corresponding to kilovolt ion energies, is Maxwellianized by strong electrostatic turbulence in the sheath. Theoretical expressions are derived for the frequency of the electron and ion spoke rotation, for the ion kinetic temperature, and for the ion heating efficiency as functions of the discharge parameters. These expressions are shown to be consistent with extensive experimental data. Author

N72-32696*# Scientific Translation Service, Santa Barbara, Calif.
APPLICABILITY OF THE HYDRODYNAMIC APPROXIMATION FOR A NONRELATIVISTIC PLASMA
V. B. Semikoz Washington NASA Sep. 1972 6 p refs Transl. into ENGLISH of "O Primenimosti Gidrodinamicheskogo Priblizheniya Dlya Nerelyativistskoy Plazmy" Rept. Pr-111 Inst. of Space Res., Acad. Sci. USSR, Moscow, 1972 8 p
(Contract NASw-2035)
(NASA-TT-F-14599; PR-111) Avail: NTIS HC $3.00 CSCL 20I

In the nonrelativistic limit of small velocities of all particles

of a given type (velocity approaches zero), the hydrodynamic description of the plasma may be improved by a more rapid isotropization of an arbitrary particle distribution in the frame of reference, where there is no macromotion. This is reflected very well in a kinematic expansion with respect to the base functions of irreducible unitary representations of a homogeneous Lorentz group. Author

N72-32697# Royal Inst. of Tech., Stockholm (Sweden).
GROWTH OF A SPACE CHARGE SHEATH IN A LOW DENSITY DISCHARGE PLASMA
S. Torven and M. Babic Sep. 1971 15 p refs
(TRITA-EPP-71-20) Avail: AEC Depository Libraries

Surged voltage drops over a low-density mercury arc in an inductive current circuit are found to be concentrated in a space charge sheath formed within the plasma. The experimental investigations aim at clarifying the conditions in the stationary plasma just before the sudden sheath growth. Some measurements during periodic sheath growth in the nonstationary plasma are also reported. The experiments are made in the positive column of a mercury arc. This plasma column is normally quiescent and a good electric conductor. When the stationary discharge current is increased sufficiently, the homogeneous electric field concentrates to a space charge sheath which separates the column in two plasmas with different properties. Author (NSA)

N72-32698# Institut fuer Plasmaphysik G.m.b.H., Garching (West Germany).
INVESTIGATION OF THE RELATION BETWEEN COMPRESSION, RELAXATION, AND END LOSSES IN THE LATE PHASES OF THETA PINCH DISCHARGES BY MEANS OF A TWO DIMENSIONAL MHD COMPUTER PROGRAMME
Wolfgang Schneider Feb. 1972 48 p refs
(IPP-1/124) Avail: AEC Depository Libraries

A two-dimensional MHD model was developed for the phases after the first fast compression of theta-pinch discharges. This model was tested by comparison with theoretical and experimental results; it turned out that the model aptly described the quasi-stationary phases of theta pinches, i.e., it is suitable for predicting theta pinch experiments and, in particluar, is an important aid for interpreting measurements. A detailed energy balance is made to determine quantities that cannot readily be measured and to discuss the relations between various effects. It is found that the plasma in the late phases is only adiabatically heated. The relaxation of temperature and anisotropy is discussed, particular attention being paid to interaction with heavy impurity ions and to determining the temperature of these ions from Doppler profiles of spectral lines. Author (NSA)

N72-32699# Scientific Research Inst. of Electro-Physical Apparatus, Leningrad (USSR).
THETA-PINCH IN ELECTRON-HOLE PLASMA WITH SURFACE GENERATION
V. V. Vladimirov, N. N. Koslovskaya, and V. F. Shanskii 1971 10 p refs In RUSSIAN
(NP-19269) Avail: AEC Depository Libraries

A theoretical study of the theta-pinch effect in an electron-hole plasma of semiconductors was carried out for the case when the velocity of surface recombination differs from zero. Results of numerical integration of equations describing the electron-hole plasma compression in a time-increasing magnetic field are given. Author (NSA)

N72-32700# Akademiya Nauk URSR, Kharkov. Fiziko-Tekhnicheskii Inst.
THEORY OF ELECTROSTATIC PROBES IN A RETARDING POTENTIAL METHOD
V. F. Aleksin and V. G. Bocharov 1971 30 p refs In RUSSIAN
(KHFTI-71-22) Avail: AEC Depository Libraries

Passage of charged particle of a plasma, with random equally probable phases of rotation, about a Larmor circle through a circular aperture and a slit of arbitrary dimensions and located in a homogeneous magnetic field perpendicular to the plane of the diaphragm was studied. Expressions are obtained for the probability of passage of the particles as a function of their positions and velocities. Using this information, a transmission function related to the distribution function of plasma particles in front of and behind the diaphragm is calculated. The essential effect on the particle distribution function in the previous beam derives from the diaphragm thickness and transverse dimensions that are equal to or less than the helical spacing and the Larmor radius of the charged-particle trajectory. Author (NSA)

N72-32701# Academy of Sciences (USSR), Moscow. Physics Inst.
SPECTRA OF MAGNETIC PULSATIONS OF NONISOTHERMAL PLASMA
M. A. Livshits and V. N. Tsytovich 1972 16 p refs In RUSSIAN
(NP-19291; Preprint-19) Avail: Depository Libraries

Nonlinear interactions and the spectra of magnetic pulsations of isothermal, turbulent plasma have been previously investigated. Under conditions of nonisothermal plasma, ion-acoustic oscillations arise both at low frequencies (collision-free Alfven and MHD waves), and at high frequencies (spiral waves). The spectrum of the turbulence associated with the magnetic pulsations is the subject of a theoretical study in both of the indicated frequency regions. NSA

N72-32702# Scientific Research Inst. of Electro-Physical Apparatus, Leningrad (USSR).
SPECTROSCOPIC EXAMINATION OF THE PARAMETERS OF A TURBULENT PLASMA
A. B. Berezin, L. V. Dubovoi, B. V. Lyublin, and D. G. Yakovlev 1971 15 p refs In RUSSIAN; ENGLISH summary
(NP-19262) Avail: AEC Depository Libraries

Parameters of highly turbulent plasma were studied. Two branches of oscillations in the discharge were found. Basic characteristics of oscillations were estimated by the profile shape of the H beta hydrogen spectral line. In the experiment, the strength of the E fields of the turbulent pulsations was about 6 kV/cm. Author (NSA)

N72-32703# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
WAVE CONVERSION IN AN INHOMOGENEOUS PLASMA
V. Agnello, P. Fieffe-Prevot, G. Ichtchenko, and S. Kulinski Dec. 1971 23 p refs
(EUR-CEA-FC-627) Avail: AEC Depository Libraries

An analysis was made to find the reflection, transmission, and absorption coefficients for a plane wave incident obliquely on an inhomogeneous anisotropic plasma layer. The differential equations for this case are derived from Maxwell's equations, together with the constitutive relations for the medium. NSA

N72-32704# Princeton Univ., N.J. Plasma Physics Lab.
CONTRIBUTION OF COMPUTER SIMULATION TO PLASMA THEORY
John M. Dawson Apr. 1972 18 p refs Presented at the 1st European Conf. on Computational Phys., Geneva, 10-14 Apr. 1972
(Contract AT(11-1)-3073)
(MATT-894; Conf-720423-1) Avail: NTIS

Recent advances in computers and in techniques for simulating plasmas made it possible to investigate complicated nonlinear and turbulent phenomena in plasmas. A number of problems were investigated: anomalous absorption of intense electromagnetic waves due to the turbulence associated with parametric instabilities excited by the electromagnetic wave, the diffusion of plasma across strong magnetic fields due to thermally excited convective motion, limiting amplitudes of ion waves, and the coupling of intense plasma oscillations due to ion

density fluctuations. From the simulation, one can generally gain an idea of the mechanisms involved and construct theories for the observed effects. The present status of simulation and a few examples of how it has been used to aid theory are given.
Author (NSA)

N72-32705# Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
MICROINSTABILITIES IN INHOMOGENEOUS PLASMA Progress Report, 1 May 1971 - 31 Jan. 1972
Terry Kammash Jan. 1972 9 p refs
(Contract AT(11-1)-1478; ORA Proj. 073430)
(COO-1478-10) Avail: NTIS

Research was devoted to the following two areas: (1) beam-plasma interactions and instabilities in the Astron system, and (2) absolute instabilities with arbitrary propagation in mirror plasmas. A brief discussion of important results in these two areas is given.
NSA

N72-32706# California Univ., Livermore. Lawrence Livermore Lab.
INITIAL OPERATION OF THE 2XII EXPERIMENT
F. H. Coensgen, W. F. Cummins, W. E. Nexsen, Jr., and T. C. Simonen 10 Mar. 1972 34 p refs
(Contract W-7405-eng-48)
(UCRL-51208) Avail: NTIS

Typical examples of plasma containment observed in the first high vacuum operation of the plasma-injected, open-ended, minimum-B 2XII experiment are discussed. The density decay curves for plasmas in which the velocity function had a single maximum exhibited no periods of abrupt plasma loss or other obvious evidence of plasma turbulence (instability). For this example, the observed value of n tau was approximately one-third that calculated for ion-ion scattering by a two-dimensional computer code. As the density fell, this discrepancy approximately doubled. In examples exhibiting periods of plasma turbulence and rapid plasma loss, there is evidence that the plasma instabilities were driven by the presence of two or more maxima in the ion velocity functions.
Author (NSA)

N72-32707# New York Univ., N.Y. Courant Inst. of Mathematical Sciences.
ABSTRACTS OF SHERWOOD THEORETICAL MEETING, 22-23 MARCH 1971
1 Dec. 1971 67 p refs
(Contract AT(11-1)-3077)
(NYO-3077-185; MF-65) Avail: NTIS

Abstracts are given for 54 of the talks presented at the conference. A status report was given by a representative from each National Laboratory. The conference, as a whole, tended to be concerned with the various instabilities associated with fusion plasmas.
Author (NSA)

N72-32708# Army Foreign Science and Technology Center, Charlottesville, Va.
THE STUDY OF PLASMA BY LASERS
L. A. Dushin and O. S. Pavlichenko 19 Apr. 1972 136 p refs
Transl. into ENGLISH from Atomizdat (Moscow), no. 6, 1968
(AD-742639; FSTC-HT-23-1043-70) Avail: NTIS CSCL 20/9

The development of optical quantum generators (lasers), with high frequency stability, narrow beam directivity and high power, opens new prospects for the study of plasmas. At the present time, lasers are widely used in interferometric measurements for determination of the spatial distribution of the electron concentration of plasmas. The theory has been rather well developed, and the first experimental investigations to appear in the area of the measurement of the density and temperature of a plasma using lasers are quite specific and promising. This book presents an attempt to generalize the principal theoretical results and experiences gained in experimental works.
Author (GRA)

N72-32709# Austin Research Associates, Inc., Tex.
TURBULENT HEATING OF PLASMA BY STREAMING INSTABILITIES Final Scientific Report
William E. Drummond, James R. Thompson, Millard L. Sloan, and Heney V. Wong Jun. 1972 73 p refs
(Contract F44620-70-C-0087; AF Proj. 9752)
(AD-744230; ARA-80; I-ARA-72-U-67; AFOSR-72-1200TR)
Avail: NTIS CSCL 20/9

The report discusses the progress which has been made toward the research goal of understanding the development and nature of turbulence generated from a source of free streaming energy within a collisionless plasma. The initial evolution of microturbulence, during which the electron drift energy is very efficiently converted to electron thermal energy and ion sloshing energy, is now largely understood. The authors have also developed a model of the late-time turbulence evolving in a driven toroidal confinement device. Several investigations have also been completed of the generation of plasma turbulence via the decay of large amplitude waves. Finally, the authors have initiated research on the feasibility of heating fusion plasmas via the injection of energetic beams of relativistic electrons.
Author (GRA)

N72-32710# Princeton Univ., N.J. Gas Dynamics Lab.
A NON-ISOTHERMAL THEORY OF AN ELECTROSTATIC PROBE IN A WEAKLY IONIZED GAS
Wen-Huei Jou Apr. 1972 93 p refs
(Contract F33615-70-C-1244; AF Proj. 7064)
(AD-744100; ARL-72-0060) Avail: NTIS CSCL 20/9

In the existing literature on the diffusion theory of the interaction between a weakly ionized plasma and a solid surface, the electron temperature is assumed to be constant. This assumption is dubious, for an absorbing probe immersed in a plasma, asymptotic theories based upon the small Debye length can be developed with electron energy balance taken into consideration. Detailed development is given here for both the cases when ions are much colder than electrons and when the temperatures of the two charged species are of the same order. The main results are as follows: (1) The current-voltage characteristics of the probe can be represented by an asymptotic series in which the leading term is the probe potential obtained under quasi-neutral approximation. (2) In general, the sheath scales are different from those obtained in isothermal theory and depend on the current (or probe potential) and the temperature ratio of the two charged species. (3) The cold ion approximation is valid only when the ion temperature is much lower than the electron temperature in both the quasi-neutral region and the sheath. (4) The ion current approaches the saturation value at a probe potential lower than that given by the isothermal theory.
Author (GRA)

N72-32711# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXCITATION OF ELECTROMAGNETIC WAVES IN A PLASMA WHERE ELECTRONS HAVE A DIRECTIONAL VELOCITY RELATIVE TO THE IONS
V. G. Makhankov 20 Mar. 1972 10 p ref Transl. into ENGLISH of Russian rept. JINR-P-917, 1962 p 1-5
(AD-744301; FTD-HT-23-1285-71; JINR-P-917) Avail: NTIS CSCL 20/9

Studies of electromagnetic wave excitation in an unlimited system consisting of ions and electrons moving in an external magnetic field show that excitation and propagation perpendicular to the electron waves, without fulfilling Cerenkov conditions, is possible.
Author (GRA)

N72-32712# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
THE MOMENTUM EQUATION TO DESCRIBE THE DYNAMICS OF ELECTRIC ARCS
Herbert O. Schrade May 1972 63 p refs
(AF Proj. 7063)
(AD-744520; ARL-72-0073) Avail: NTIS CSCL 20/9

Based on the momentum equation, a three dimensional, self consistent analysis is presented which may lead to a better qualitative and quantitative understanding of the dynamics of electric arc discharges exposed to arbitrary flow and magnetic fields. By balancing the gasdynamic surface stress force per unit arc length with the corresponding force of the Maxwell's stress, one is able to derive an analytical expression for the resultant momentum-transport between a curved, current-carrying column, and its nonconducting surrounding gas. This momentum-transport per unit time and arc length represents a propelling and/or friction force which determines the arc motion with respect to the outer gas. Stable arc modes and the principle of arc dynamics are discussed by means of a few examples constituting an arc in a transverse flow and a transverse magnetic field.
Author (GRA)

N72-32713# Polytechnic Inst. of Brooklyn, N.Y.
RESEARCH OF AEROPHYSICS INSTITUTE FOR STRATEGIC TECHNOLOGY Semiannual Technical Summary, period ending 31 Aug. 1971
Martin H. Bloom 31 Aug. 1971 31 p refs
(Contract DAHC04-69-C-0077; ARPA Order 1442)
(AD-744533; PIBAL-71-B; AROD-8677-26-P) Avail: NTIS CSCL 20/9

The report contains a description of the technical problem areas and accomplishments achieved during the reporting period. In addition, a complete list of publications, presentations, lectures, etc. is included and the personnel associated with this program are listed. The research projects are in the general subject areas of fluid and plasma dynamics. Author (GRA)

N72-32714# Technische Hochschule Munchen (West Germany). Elektrophysikalisches Inst.
TRANSPORT PROPERTIES IN HIGH POWER ARCS Final Report, 1 Feb. 1967 - 31 Jan. 1971
Heinz H. Maecker Wright-Patterson AFB, Ohio ARL May 1972 74 p refs
(Contract F61052-57-C-0081; AF Proj. 7063)
(AD-744518; ARL-72-0070) Avail: NTIS CSCL 20/9

In order to investigate transport and radiation properties of various plasmas the cascade arc chamber was improved with respect to new electrodes, to pressure proof, and to air-cooled plates for low power input and was made fit for viscosity measurements by providing a honeycomb flow rectifier and pressure taps along the cascade. The temperature distribution across the H2 - arc has been re-examined by all methods available with high precision. The splitting of the heat flux potential curves vs. temperature at low currents in the N2 arc could be removed by reducing the electron temperature to the gas temperature taking into account inelastic collisions between electrons and N2 molecules. In the Ar-arc radiation plays a dominant role and changes rapidly with elevated pressures. Therefore extended measurements of all quantities of interest have been carried out at temperatures up to 25,000 K and in the pressure range from 1 to 10 atms. GRA

26 PHYSICS, SOLID-STATE

Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

N72-32715*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TWISTED, MULTIFILAMENT Nb3Sn SUPERCONDUCTIVE RIBBON
Willard D. Coles 1972 7 p refs Presented at 4th Intern. Conf. on Magnet Technol., Upton, N. Y., 19-22 Sep. 1972
(NASA-TM-X-68124; E-7092) Avail: NTIS HC $3.00 CSCL 20L

An experimental study of superconductor stabilization has resulted in the successful application of the concepts of filamentary structure and conductor twist to Nb3Sn ribbon. The Nb3Sn is formed in parallel, helical paths, which are continuous around the ribbon. Short lengths (12-18cm) of 1.27 cm wide superconductive ribbon were produced. The filamentary and twist characteristics are incorporated in the ribbon by means of an inert mask formed on the ribbon surface early in the fabrication process. Diffusion reaction of the niobium and tin is prevented at the filament boundaries. Described are the conductor methods of fabrication, and test results obtained. The technology required to adapt the processes for the production of long lengths of ribbon is available. Author

N72-32716*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FABRICATION STUDIES OF Nb3Al SUPERCONDUCTORS
J. Laurence, F. J. Worzala (Wisconsin Univ., Madison), W. J. Yang (Wisconsin Univ., Madison), B. P. Strauss (Wisconsin Univ., Madison), and R. W. Boom (Wisconsin Univ., Madison) 1972 13 p refs Presented at 4th Intern. Cryog. Eng. Conf., Eindhoven, Netherlands, 24-26 May 1972
(Grant NGR-50-002-116)
(NASA-TM-X-68126) Avail: NTIS HC $3.00 CSCL 20L

A study aimed at fabricating a stabilized conductor containing both binary and ternary intermetallics of the Nb-Al system is presented. Author

N72-32717*# Kanner (Leo) Associates, Redwood City, Calif.
BROWNIAN MIGRATION OF CRYSTALLITES ON A SURFACE: THE CASE OF ALUMINUM ON KCl; CLARIFICATION OF THE SLIP MECHANISM, PART 3
J. J. Metois, M. Gauch, A. Masson, and R. Kern Washington NASA Mar. 1972 17 p refs Transl. into ENGLISH of "Migration Brownenne de Cristallites sur une Surface, Cas de l'Aluminium sur KCl. Precisions sur le Mecanisme de Glissement, 3", Provence Univ., Marseille, report Sponsored by NASA
(NASA-TT-F-14459) Avail: NTIS HC $3.00 CSCL 20L

It is shown experimentally that crystallites of aluminum are able to migrate on a (100) KCl substrate (contact plane (111)). The measurements give a free activation enthalpy of their diffusion which contains a term Delta G sub 0 which is independent of the crystallites dimensions and a term Delta G sub m proportional to the contact area of the crystallites. Delta G sub m becomes zero at a temperature T = 465 K. The interface model of the crystallites gives the meaning of the melting temperature of the islands which ensure the coherence between deposit and substrate. Delta G sub m is the free enthalpy of melting of these islands, Delta G sub 0 is the activation free enthalpy of the interface viscosity if there is no coherence.
Author

N72-32718*# Tyco Labs., Inc., Waltham, Mass.
THICK FILM SILICON GROWTH TECHNIQUES Quarterly Progress Report, 1 Jun. - 31 Aug. 1972
H. E. Bates, F. H. Cocks, A. I. Mlavsky, and F. Wald 31 Aug. 1972 32 p refs Prepared for JPL
(Contracts NAS7-100; JPL-953365)
(NASA-CR-128415; QPR-2) Avail: NTIS HC $3.75 CSCL 20L

Silicon ribbon growth experiments were conducted using orifices (dies) fabricated from SiC-SiO2 mixtures, fused quartz, SiC, and fine-grained, high density graphite. The best results were obtained from graphite dies. A number of different approaches was tried in modifying the thermal gradient in the dies and in holding the dies. The best results here were obtained from a 0.25-in. thick Mo disc holding a graphite die directly and fitting the die quite closely. Ribbon growths as wide as 9 mm were obtained, while the longest ribbon was 450 x 3.5 x 0.5 mm. Resistivities of ribbons grown from graphite dies have been measured over the range of 0.03 to 1.6 ohm-cm. Some thoughts and literature findings are presented regarding refractory oxide materials as potential orifices. Author

N72-32719*# Radio Corp. of America, Princeton, N.J.
IMPROVING THE EFFICIENCY OF GaP LED'S WHICH EMIT GREEN LIGHT Final Report, 13 Apr. 1971 - 12 Apr. 1972
I. Ladany and H. Kressel May 1972 44 p refs
(Contract NAS1-10696)
(NASA-CR-112111; PRRL-72-CR-20) Avail: NTIS HC $4.25 CSCL 20L

A study of techniques for preparing n-type material and junctions which yield the most consistent high diode efficiency values high lighted the role that Ga vacancies and/or associated defects play in reducing the green luminescent efficiency of n-type GaP. A useful method for obtaining good quality material was developed. It is shown that junction formation at high temperatures in a process where the n to p transition occurs without removing the substrate from the furnace yields devices superior to those obtained by diffusion or double epitaxy in the conventional manner previously used for GaP junction formation. Author

N72-32720# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
ON EXPERIMENTAL DETERMINATION OF THE TRUE VALUE p SUB f OF TYPE-2 SUPERCONDUCTORS
I. N. Goncharov, G. L. Dorofeev, L. V. Petrova, and I. S. Khukhareva 1972 21 p refs In RUSSIAN
(JINR-P8-6260) Avail: AEC Depository Libraries

In an experimental study of the resistance states of the type-2 superconductors, it was observed that presence of a sufficiently extended linear range in the volt-ampere characteristic in some cases does not prove the negligibly small effect of the heating of a sample. This fact is proved by a strong dependence of the measured values on the medium surrounding the sample (He2, He1 helium pairs). The calculation is performed taking into account the sample overheating with respect to the helium bath. Based on this calculation, peculiarities of the volt-ampere characteristics are explained, and an attempt is made to determine the true value of the differential resistance corresponding to the helium bath temperature. Author (NSA)

N72-32721# Signals Research and Development Establishment, Christchurch (England).
POTENTIAL DISTRIBUTIONS IN SURFACE P-N JUNCTIONS
J. S. Hill, W. S. Nicol, and A. K. Walton (Sheffield Univ., Engl.) Sep. 1971 16 p refs
(SRDE-71023; BR-27075) Avail: NTIS HC $3.00

An analysis of the potential and charge distributions existing in surface P-N junctions is presented. These junctions arise when, for example, a thin layer of one conductivity type is formed on a substrate of opposite conductivity type. It is shown that when the layer is thin the built-in potential of the semi-infinite junction which corresponds to the Fermi level difference of the constitutent P and N regions, will not be realised. For an N-type layer which is thick enough for hole enhancement to be negligible but thin enough for electron depletion to be considered complete, the built-in potential and potential across the layer are both proportional to the square of layer thickness. In thinner layers hole enhancement is important. Computations have been made for a wide range of doping concentrations in the junction. Author (ESRO)

N72-32722# Lincoln Lab., Mass. Inst. of Tech., Lexington.
EuTe. 1: MAGNETIC BEHAVIOR OF INSULATING AND CONDUCTING SINGLE CRYSTALS
Nei F. Oliveira, Simon Foner, Yaacov Shapira, and Thomas Reed 7 Jun. 1971 14 p refs Repr. from Phys. Rev., v. 5, no. 7, 1 Apr. 1972 p 2634-2646
(Contract F19628-70-C-0230)
(AD-742603; TA-3919; ESD-TR-72-92) Avail: NTIS CSCL 20/12

The magnetic properties of both insulating and conducting single crystals of EuTe were measured at temperatures 0.4 = or < T = or < 273K in magnetic fields O = or < H < 150 kOe. The insulating EuTe showed the behavior expected for an Heisenberg antiferromagnet and is believed to be representative of pure EuTe. The results in the conducting single crystals (which were n type) showed that magnetic properties were influenced by the presence of the charge carriers. Author (GRA)

N72-32723# Nebraska Univ., Lincoln. Electrical Materials Lab.
THIN FILM INTERFACES. PROPERTIES OF VERY THIN COATINGS FOR ELECTRICAL APPLICATIONS Final Report
N. M. Bashara 14 Apr. 1972 18 p refs
(Contracts N00014-70-A-0235-0001; NONR-3718(01))
(AD-744065) Avail: NTIS CSCL 20/12

The report results of optical (ellipsometric) and electrical characterization of thin interfaces are summarized. Documentation of publications is given to 13 publications which resulted from the effort and 30 related publications, all involving the use of ellipsometry. Author (GRA)

N72-32724# Florida Univ., Gainesville. Dept. of Electrical Engineering.
A CENTER OF COMPETENCE IN SOLID STATE MATERIALS AND DEVICES
Fredrik A. Lindholm, Arthur J. Brodersen, Eugene R. Chenette, Larry Z. Hench, and Sheng S. Li 10 Oct. 1971 177 p refs
(Contract F19628-68-C-0058; ARPA Order 1060; AF Proj. 8687)
(AD-743834; AFCRL-72-0075; SR-8) Avail: NTIS CSCL 20/12

Contents: Photodetection using photomagnetoelectric and dember effects in gold-doped silicon; Investigation of the recombination and trapping processes of photo-injected carriers in semi-insulating Cr-doped GaAs using PME and PC methods; Low temperature photomagnetoelectric and photoconductive effects in n-type InAs; The effect of a buried layer on the collector breakdown voltages of bipolar junction transistors; Device characterization for computer analysis of large semiconductor circuits; Structural effects on fast neutron radiation sensitivity of semiconducting glasses; Effects of microstructure on the radiation stability of amorphous semiconductors; Electronic materials interfacial characterization program. GRA

N72-32725# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ZERO-PHONON LINE ABSORPTION SPECTRA OF RADIATION DAMAGE CENTERS IN SILICON M.S. Thesis
Kennedy B. Wilson Jun. 1972 106 p refs
(AD-743987; GNE/PH/72-11) Avail: NTIS CSCL 20/12

Infrared absorption measurements were made for n-type silicon samples irradiated with 1 MeV electrons at room temperature. The absorption spectra in the range 1-3 microns were recorded at both liquid nitrogen and liquid helium temperatures. Three families of zero-phonon lines and phonon-assisted sideband structure were seen which correspond to those seen in luminescence spectra. The families at 0.4891 eV and 0.7898 eV were seen only in pulled samples, while the family at 0.9702 eV was seen in both pulled and float-zone samples. A dose rate study indicated that all three families are independent of each other. The zero-phonon lines at 0.7898 eV, 0.7948 eV, and 0.4891 eV may follow of the divacancy. Author (GRA)

N72-32726# North Carolina Univ., Chapel Hill. Dept. of Physics.
SUPERCONDUCTING TUNNELING IN SINGLE CRYSTAL THIN FILMS Final Report
Earl N. Mitchell Mar. 1972 9 p refs
(Grant AF-AFOSR-1241-67; AF Proj. 9764)
(AD-743442; AFOSR-72-0963TR) Avail: NTIS CSCL 20/12

A study of the superconducting and Fermi surface properties of single crystal thin films using tunneling techniques is reported.

Emphasis was placed on studying these characteristics experimentally as a function of orientation. The Fermi velocity was determined by studying the observed Tomasch oscillations. Most of the work was performed on films grown by epitaxy on alkali halide substrates. The study was confined to aluminum, tin, and lead. Author (GRA)

N72-32727# Massachusetts Inst. of Tech., Cambridge. Solid State Device Research Group.
DIFFUSION IN THE LEAD CHALCOGENIDES
James N. Walpole and Richard L. Guldi May 1972 33 p refs
(Contract N00014-67-A-0204-0010)
(AD-743485; Solid-State-Device-TR-10) Avail: NTIS CSCL 20/12

The dependence on the deviation from stoichiometry of the diffusion coefficients describing interdiffusion (junction diffusion) and self-diffusion (radioactive tracer diffusion) of the constitutent atoms of the lead chalcogenides is obtained for the general case in which diffusion may occur through interstitials, vacancies, and divacancies simultaneousiy. This model indicates the appropriate experimental conditions for obtaining diffusion data of the two types and provides an explicit framework for interpretation of results and identification of the diffusion mechanisms. It is shown that the parameters characterizing the interdiffusion process may be evaluated independently by an appropriate combination of self-diffusion measurements. Comparisons of this type are made with existing data. Author (GRA)

N72-32728# New Mexico Univ., Albuquerque. Bureau of Engineering Research.
LOW TEMPERATURE INVESTIGATIONS OF EPITAXIAL SILICON USING THE MICRO-HALL DEVICE
J. P. Baca, H. D. Southward, and R. A. Colclaser May 1972 80 p refs
(Contract N00014-68-A-0158)
(AD-744343; EE-196(72)ONR-005) Avail: NTIS CSCL 14/2

The report is concerned with the feasibility of using the micro-Hall device, introduced by Colclaser and Southward, as a tool for determining important electrical characteristics of epitaxial silicon at low temperatures. The theory of carrier concentration and mobility as a function of temperature in the low temperature range is presented. A contact diffusion mask is introduced which eliminates the formation of an unwanted junction at the substrate contacts and aids in the formation of ohmic contacts. The refrigerator (cryo-tip) used to obtain low temperatures and a special designed specimen holder which connects to the cryo-tip are described. Author (GRA)

N72-32729# Naval Weapons Lab., Dahlgren, Va. Surface Warfare Dept.
PRELIMINARY EQUATION SYSTEM DESCRIBING THE EFFECT OF STACKING FAULTS ON ULTRASONIC REFLECTIVITY
C. E. Springer Apr. 1972 42 p refs
(AD-744240; NWL-TR-2732) Avail: NTIS CSCL 20/2

A system of equations which describes the conic pattern reradiated from a crystalline surface can aid in analysis of the fault structure of a crystalline material. A preliminary study of such a system has been made. A bounded, ultrasonic beam reflected from a liquid-solid interface will show a reflectivity in disagreement with theoretically predicted reflectivities. Some possible mechanisms which would explain this discrepancy are discussed and a theoretical model for the system is outlined. Author (GRA)

N72-32730# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
X RAY TOPOGRAPHIC OBSERVATIONS OF SLIP DISTRIBUTIONS IN ALPHA SILICON CARBIDE
Harold Posen and Jane A. Bruce 30 Mar. 1972 19 p refs
(AF Proj. 5621)
(AD-744076; AFCRL-72-0225; AFCRL-PSRP-485) Avail: NTIS CSCL 20/2

An X-ray topographic study is made of three hexagonal SiC crystals, type 6H, of different national origin. All three crystals exhibit a high density of dislocations, many originating at the nucleation edge of the crystal and fanning out to the crystal boundaries. Burgers vectors were identified. Slip in the 1,1,-2,0 direction, characteristic of hexagonal materials, was observed. Author (GRA)

N72-32731# Boeing Co., Seattle, Wash. Aerospace Group.
NONLINEAR PHENOMENA IN SEMICONDUCTORS THROUGH MULTIPHOTON ABSORPTION Interim Scientific Report, 1 Apr. 1971 - 31 Mar. 1972
Betsy Ancker-Johnson, Hans J. Fossum, and Wen S. Chen May 1972 32 p refs
(Contract F44620-71-C-0055; AF Proj. 9763)
(AD-744131; D180-15000-1; AFOSR-72-1211TR) Avail: NTIS CSCL 20/12

Contents: Production of plasma by two photon absorption of CO2 - laser light in InSb; Conductivity vs. laser intensity; Cross-section for two-photon absorption; Time decay and spatial dependence of the plasma density; Heating of the plasma; Measurement of minority carrier mobility; Surface recombination; Recombination radiation; Transmitted vs. incident light; Pulse shaping of the laser beam. GRA

N72-32732# International Business Machines Corp., Hopewell Junction, N.Y. East Fishkill Lab.
MATHEMATICAL SIMULATION OF THE EFFECTS OF IONIZING RADIATION ON SEMICONDUCTORS Final Report, 1 Feb. 1970 - 31 Dec. 1971
David P. Kennedy 31 Jan. 1972 96 p refs
(Contract F19628-70-C-0098; AF Proj. 4608)
(AD-744093; AFCRL-72-0257) Avail: NTIS CSCL 09/1

The report outlines results of two-dimensional mathematical investigations initiated during the present contract period: the insulated gate field-effect transistor, the Schottky barrier field-effect transistor and the bipolar transistor. In addition, information is presented on the mathematical technique used to solve these semiconductor device problems. A discussion is presented on a newly developed method for numerically solving the two-dimensional ambipolar diffusion equations for holes and electrons in semiconductor material. All numerical computations of this type use underrelaxation as a means to attain computational stability; the present discussion outlines the automation of this underrelaxation process whereby all device calculations can be performed on a hands-off basis. Another new aspect of this computational method is the adoption of a formulation that provides rapid convergence of the calculated electric current in investigations of semiconductor devices. Author (GRA)

N72-32733# Westinghouse Research Labs., Pittsburgh, Pa.
PARAMAGNETIC RESONANCE STUDIES OF Y2O3, CeO2, AND ThO2 Final Report, 1 Jul. 1968 - 1 Mar. 1971
George R. Wagner, Joseph Murphy, and Donald Feldman Wright-Patterson AFB, Ohio ARL Feb. 1972 82 p refs
(Contract F33615-68-C-1681; AF Proj. 7021)
(AD-744516; ARL-72-0026) Avail: NTIS CSCL 20/12

Electron spin resonance investigations of paramagnetic point defects in single crystals of Y2O3, CeO2 and ThO2 are reported. Centers which were present in the as grown crystals as well as those induced by low temperature, uv irradiation were studied. In some cases, the bleaching of uv induced centers was correlated with thermoluminescence peaks of the same sample. Models for some of the uv induced centers are proposed and theoretical calculations of the g-values were carried out. Author (GRA)

N72-32734# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE SPECTRUM OF REFLECTION OF THE CHALCOGENIDES OF ANTIMONY AND BISMUTH

S. D. Shutov, V. V. Sobolev, Yu. V. Popov, and S. Shestatskii 10 Mar. 1972 19 p refs Transl. into ENGLISH from the publ. "Khimicheskaya Svyaz v Poluprovodnikakh" Minsk, Izd-vo Nauka i Tekhnika, 1969 p 58-70
(AF Proj. 7343)
(AD-744278; FTD-MT-24-1230-71) Avail: NTIS CSCL 20/12

A comparative experimental study of the reflection spectra made it possible to reveal the deep similarity of the compound zone structure inside each isomorphic group of crystals in question and the general features in the zone structure of both groups. It is also evident that during the calculation of the zone arrangement of compounds which include atoms of the bismuth type it is necessary to consider relativistic effects. Apart from this, it was possible to obtain some information about the nature of the minimum interzone interval in rhombic crystals and about the nature of states responsible for transitions in various areas of energies. Author (GRA)

N72-32735# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
PREPARATION AND OPTICAL PROPERTIES OF CRYSTALS AND FILMS OF VANADIUM OXIDES
John C. C. Fan May 1972 96 p refs
(Contracts N00014-67-A-0298-0012; DAHC15-67-C-0219; NR Proj. 017-308)
(AD-744319; HP-28; ARPA-TR-43) Avail: NTIS CSCL 20/12

The manuscript describes mainly the preparation and optical properties of crystals and films of some of the vanadium oxides. In addition, different methods of determining the optical constants of solids are discussed and compared. Author (GRA)

N72-32736# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHALCOGENIDE GLASS SEMICONDUCTORS, 2
A. Vasko, I. Srb, and D. Lezal 3 Apr. 1972 13 p refs Transl. into ENGLISH from Elektrotech. Cas. (Czechoslovakia), v. 21, no. 7, 1970 p 524-530
(AD-744249; FTD-HC-23-1786-71) Avail: NTIS CSCL 20/12

The report contains a review including behavior of the electrical conductivity of glassy semiconductors in general, temperature dependences of given electrical conductivity, switching, memory, thermoelectricity, and photoelectricity effects. These properties depend strongly in the composition of the materials. In comparison with the crystalline semiconductors, the chalcogenide glasses are characterized by slight dependence of electrical conductivity on impurities. Further, they show isotropy of all properties, low mobility of current carriers, and the possibility of changing the properties by wide deviations from stoichiometry. Author (GRA)

N72-32737# Medical Coll. of South Carolina, Charleston.
NONEQUILIBRIUM CRYSTALLIZATION OF CARBON DIOXIDE IN A DUCTED AXISYMMETRIC JET Technical Progress Report
John Anthony Pearce Dec. 1971 88 p refs
(Contract DA-49-146-XZ-574)
(AD-744338; DNA-2837(T)) Avail: NTIS CSCL 07/4

Solid particles of CO_2 can be made in a two-stage expansion directly from bottled gas. The first stage of the expansion, a ducted-axisymmetric jet, was chosen as the subject of the report. The first stage was modeled by the appropriate theories of nucleation, growth, gas dynamics, and flow-field conditions. The solution of the theories was accomplished by means of a digital simulation of the flow field. Experimental results prove that the theoretical results are incorrect. Experimental results show that the first stage produces a mass fraction of less than 1 percent, a significant deviation from isentropic prediction of about 15 percent. A totally empirical approach to the jet is recommended. The research was conducted in connection with abrasive removal of burnt tissue eschar. GRA

N72-32738# Connecticut Univ., Storrs. Inst. of Materials Science.
LATTICE THERMAL CONDUCTIVITY OF A DEFORMED COPPER-GERMANIUM ALLOY
A. J. Friedman Apr. 1972 21 p refs
(Contract F44620-69-C-0011; AF Proj. 9560)
(AD-744127; AFOSR-72-0997TR) Avail: NTIS CSCL 20/12

Results are presented on the isochronal annealing recovery of the 1-4 K lattice thermal conductivity of a deformed Cu and 7 atomic % Ge polycrystal. The theory of the modification of dislocation thermal resistivity by solute atmospheres, due to Klemens and Ackerman, predicts a gradual recovery of the lattice conductivity with annealing temperature, up to the recrystallization temperature (700 K), due to thermal dispersing of the atmospheres. No effect is observed in this alloy, suggesting that the solute atmospheres did not form upon deformation, or that there was no significant dispersal of the atmospheres by diffusion of the solute atoms away from the dislocations below the recrystallization temperature. Author (GRA)

N72-32739# Chicago Univ., Ill.
ELECTRONIC STRUCTURE AND TRANSPORT PROPERTIES OF AMORPHOUS SEMICONDUCTORS Final Report, 27 Jun. 1969 - 26 Mar. 1972
M. H. Cohen 26 Mar. 1972 7 p refs
(Contract DAHC04-69-C-0091)
(AD-744525; AROD-8595-16-P) Avail: NTIS CSCL 20/12

The research on the project has fallen into four general categories: (1) synthetic, in which attempts have been made to build up a broad overview of the entire subject of the electronic structures of disordered materials; (2) precise studies of simple model systems; (3) formulating and applying simplified models of real materials; and (4) accurate studies of real materials. The report summarizes the results of this research. Author (GRA)

N72-32740# IBM Watson Research Center, Yorktown Heights, N.Y.
EXPERIMENTAL AND THEORETICAL PHYSICS Final Report, 31 May 1969 - 12 May 1972
L. Esaki 12 May 1972 8 p refs
(Contract DAHC04-69-C-0069)
(AD-744524; AROD-8511-21-P) Avail: NTIS CSCL 20/12

The report presents the results of a man-made superlattice: a one-dimensional long-period superlattice in monocrystalline semiconductors with an advanced epitaxy technology. This project was primarily aimed at achieving an electronic superlattice, although the technology, once established, can be applied to form other kinds of superlattices. Theoretical analysis for an electronic superlattice has predicted that a quantum mechanical effect, associated with the periodic potential, gives rise to intriguing nonlinearities in transport and optical properties such as a negative differential conductivity, higher harmonic generation, etc. With a nearly ideal superlattice structure, it may be possible to build an oscillator or an amplifier being operated up to 1 tera Hz (sub mm wave), far beyond the frequency range of the existent solid state devices. Thus, one can view this project to be directed toward exploring future generation semiconductor devices and technologies. Author (GRA)

N72-32741# Case Western Reserve Univ., Cleveland, Ohio. Div. of Metallurgy and Materials Science.
IMPROVED REFRACTORY OXIDES FOR STRUCTURAL APPLICATIONS. PART 1: SLIP SYSTEMS IN ALUMINUM OXIDE Al_2O_3. PART 2: ON THE YIELD POINT IN SAPPHIRE
J. D. Snow (Ferro Corp., Cleveland), A. H. Heuer, and R. F. Firestone May 1972 43 p refs
(Contract N00014-67-A-0404-0003; NR Proj. 032-508)
(AD-743980; TR-6) Avail: NTIS CSCL 20/2

Two reports are presented. In the first, crystallographic notation for Al_2O_3 is reviewed, with particular reference to the correct basis to be used in describing slip systems. Electron microscopical analysis of an alumina polycrystal deformed about

5% at 1150 C under a hydrostatic confining pressure confirmed that pyramidal slip occurred. The second discusses yielding in sapphire undergoing basal slip. This appears to occur by a dislocation multiplication mechanism and thus depends on the initial density of dislocation sources. Thermal treatments employed--annealing and flame polishing--raised the lower yield stress. This hardening appears to be caused by precipitation of gaseous or solid precipitates. In addition, a yield drop can be induced in sapphire by strain aging. GRA

27 PROPELLANTS

Includes fuels; igniters; and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

N72-32742*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ECONOMIC STUDY OF FUTURE AIRCRAFT FUELS (1970-2000)
Arthur D. Alexander, III Sep. 1972 30 p refs
(NASA-TM-X-62180) Avail: NTIS HC $3.50 CSCL 21D

Future aircraft fuels are evaluated in terms of fuel resource availability and pricing, processing methods, and economic projections over the period 1970-2000. Liquefied hydrogen, methane and propane are examined as potential turbine engine aircraft fuels relative to current JP fuel. Author

N72-32743*# Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
HYDROCARBON POLYMERIC BINDER FOR ADVANCED SOLID PROPELLANT Second Addendum to Triennial Report, 1 Oct. 1969 - 1 Aug. 1971
James E. Potts, ed., A. C. Ashcraft, Jr., and E. W. Wise 31 Dec. 1971 108 p ref Prepared for JPL
(Contracts NAS7-100; JPL-951210)
(NASA-CR-128300) Avail: NTIS HC $7.50 CSCL 21I

The results of curing vinyl alcohol terpolymers of ethylene, propylene and vinyl acetate are reported for an average functionality of 1.24 when reacted with an equivalent amount of diisocynate, and saturated polyisoprene derivative is described having terminal methyl ester functionality. The development is reported of two hydroxy-telechelic polyisoprenes prepared by DEAB initiated free radical polymerization followed by LiAlH4 reduction of the end groups. F.O.S.

N72-32744# Naval Ordnance Station, Indian Head, Md.
THE MANUFACTURE OF SPHERICAL ALUMINUM POWDER BY THE FLUID ENERGY MILL PROCESS Final Report on Phase 1
Ai J. Colli 15 May 1972 14 p
(AD-743484; NOS-IHTR-354) Avail: NTIS CSCL 11/6

The feasibility was demonstrated of making spherical aluminum powders for use in propellant grains by rounding commonly available random-shape aluminum powder in a fluid energy mill operating on inert gas. The powders produced meet the specifications for the Standard Missile Rocket Motor Mk 56 Mod 0 and the Sidewinder 1C propellants and can be tailored to meet other needs. The total cost is about $5 per pound less than that of the traditional method, and the facilities are safer.
Author (GRA)

N72-32745# Rocketdyne, Canoga Park, Calif.
ENGINEERING PARAMETERS STUDY OF NITROGEN TETROXIDE FLOW DECAY Final Report
R. C. Mitchell, J. V. Lecce, and K. W. Fertig Edwards AFB, Calif. AFRPL Jun. 1972 69 p refs
(Contract F04611-71-C-0034)
(AD-744110; R-8950; AFRPL-TR-72-38) Avail: NTIS CSCL 21/2

An experimental and analytical program was conducted as a step in a systematic engineering parametric study to establish the necessary engineering criteria for the prediction and prevention of flow decay in operational nitrogen tetroxide systems. Tests were made with both green and red-brown nitrogen tetroxide over ranges of seven other parameters: initial propellant temperature, temperature drop before reaching the test section, time during which the temperature drop is imposed, filter pore size, local velocity through the filter, total volume per unit filter area of propellant passing through the filter during a test, and iron saturation condition. Author (GRA)

28 PROPULSION SYSTEMS

Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

N72-32746 Engineering Sciences Data Unit, London (England).
CURVES FOR USE IN THE DETERMINATION OF GROSS THRUST AND MASS FLOW IN FLIGHT. (AIR BREATHING DUCTED-FLOW ENGINES WITH CONVERGENT NOZZLES)
Apr. 1969 21 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-69008) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Curves are presented for use with total head and static pressure sampling methods for measurement of thrust and flow in flight. Gamma curves for combustion products are given for various fuel/air mixtures. The two sampling methods are analyzed mathematically for gross thrust, mass flow, and choking pressure ratio. K.P.D.

N72-32747 Engineering Sciences Data Unit, London (England).
THE DETERMINATION OF GROSS THRUST AND MASS FLOW IN FLIGHT. (AIR BREATHING DUCTED-FLOW ENGINES WITH CONVERGENT NOZZLES)
Mar. 1969 10 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-69007) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The measurement of gross thrust and nozzle mass flow is considered. These may be calculated from the total pressure, static pressure, and total temperature distribution. Techniques involving measurements in the jet pipe are discussed, as well as techniques for measurements in the efflux. K.P.D.

N72-32748 Engineering Sciences Data Unit, London (England).
INTRODUCTION TO THE MEASUREMENT OF THRUST IN FLIGHT. (AIR BREATHING DUCTED-FLOW ENGINES)
Jul. 1969 10 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-69006) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Intrinsic thrust and drag are considered for air breathing engines in flight. A definition of standard thrust is given. Overall thrust and the compatibility of thrust and external force definitions are discussed. K.P.D.

N72-32749# Advisory Group for Aerospace Research and Development, Paris (France). Fluid Dynamics Panel.
AERODYNAMIC PROBLEMS OF HYPERSONIC VEHICLES. VOLUME 2: PROPULSION OF HYPERSONIC VEHICLES
R. C. Pankhurst, ed., Roger Marguet (ONERA), Marcel Barrere

(ONERA), and Rene Ceresuela (ONERA) Jul. 1972 129 p refs in FRENCH; ENGLISH summary Lectures presented at Rhode-St.-Genese, Belgium, 18-23 Jan. 1970; sponsored in part by the von Karman Inst.
(AGARD-LS-42-Vol-2; ONERA-NT-169) Avail: NTIS HC $8.50

Propulsion of hypersonic vehicles is discussed, including choice of propulsion mode, rocket propulsion, statoreactors, and aerodynamic problems.

N72-32750 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CHOICE OF PROPULSION MODE, PART 1 [CHOIX DU MODE DE PROPULSION, PARTIE 1]
Roger Marguet *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 2 Jul. 1972 p 5-21 In FRENCH (For availability see N72-32749 23-28)

The choice of a propulsive system for hypersonic vehicles is considered. The criteria for this choice were analyzed, as well as the thermodynamic and technological possibilities of the chemical or nuclear rocket, and the air breathing propulsion with either subsonic or supersonic combustion. Solutions are suggested. It is shown, from projects under development, that at hypersonic speeds, the interdependence between propulsion, aerodynamics, and structures is of primary importance. Author

N72-32751 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ROCKET PROPULSION, PART 2 [PROPULSION PAR FUSEE, PARTIE 2]
Marcel Barrere *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 2 Jul. 1972 p 23-59 refs In FRENCH (For availability see N72-32749 23-28)

General aspects of rocket propulsion are discussed, including performance and operating principles. A system utilizing liquid oxygen and hydrogen as a propellant is considered. Results obtained using this propulsion means, especially in connection with the Apollo flights, are reviewed. Thermonuclear propulsion systems are also analyzed. This type of propulsion is still at the test bench stage. Possibilities for its application to hypersonic vehicles are considered. Transl. by K.P.D.

N72-32752 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
STATOREACTORS, PART 3 [STATOREACTEURS, PARTIE 3]
Roger Marguet *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 2 Jul. 1972 p 61-94 refs In FRENCH (For availability see N72-32749 23-28)

The essential features of the statoreactor are considered, in comparison to a turboreactor. Its application to hypersonic aircraft, satellite launch vehicles, and military interceptor missiles is discussed. The functions of air intake, combustion chamber, and ejector are reviewed, as well as general performance. The problems of application are analyzed and technological problems are examined. A theoretical study of supersonic combustion in the chamber when hypersonic speeds of a certain value are attained is also presented. Transl. by K.P.D.

N72-32753 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
AERODYNAMIC PROBLEMS, PART 4 [PROBLEMES AERODYNAMIQUES, PARTIE 4] c01
Rene Ceresuela *In* AGARD Aerodyn. Probl. of Hypersonic Vehicles, Vol. 2 Jul. 1972 p 95-122 refs In FRENCH (For availability see N72-32749 23-28)

General problems of quality and stability are examined in connection with hypersonic vehicles. Topics considered include concepts of atmospheric propulsion aircraft, space shuttles, aeroelasticity, heating and efficiency of controls. Relative costs of various aerospace systems are presented. Transl. by K.P.D.

N72-32754*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIRCRAFT ENGINE POLLUTION REDUCTION
Richard A. Rudey 1972 10 p refs Presented at EASCON 72, Washington, D. C., 16-17 Oct. 1972
(NASA-TM-X-68129; E-7118) Avail: NTIS HC $3.00 CSCL 21A

The effect of engine operation on the types and levels of the major aircraft engine pollutants is described and the major factors governing the formation of these pollutants during the burning of hydrocarbon fuel are discussed. Methods which are being explored to reduce these pollutants are discussed and their application to several experimental research programs is pointed out. Results showing significant reductions in the levels of carbon monoxide, unburned hydrocarbons, and oxides of nitrogen obtained from experimental combustion research programs are presented and discussed to point out potential application to aircraft engines. Author

N72-32755# Royal Aircraft Establishment, Farnborough (England).
POSSIBILITIES FOR THRUST DETERMINATION IN AN AIRCRAFT
Heinz Dissen Aug. 1972 19 p refs Transl. into ENGLISH from Z. Flugwiss. (West Ger.), v 19, no. 4, 1971 p 173-279
(RAE-Lib-Trans-1650) Avail: NTIS HC $3.00

A series of possible methods for thrust determination in an aircraft are described. An indication of the thrust can be made use of in the test phase of an aircraft; but it can also be employed at a later stage for monitoring of the propulsion unit, for propulsion unit and flight control, and, finally, for flight optimization. Indirect methods for thrust measurement are described, and the relation between the measurement parameters and the thrust is indicated. The sensitivity of the procedure to measurement errors is considered. Finally, the problems of a direct thrust measurement are considered; and the necessary requirements on the propulsion unit mounting are stated. The procedure most likely to solve the problems described is a direct thrust measurement. Author

N72-32756# Dayton Univ. Research Inst., Ohio.
COMPUTER PROGRAMS FOR SINGLE STAGE AXIAL COMPRESSOR TEST DATA ANALYSIS. VOLUME 2: PROGRAM LISTINGS AND SAMPLE CALCULATIONS Final Technical Report, 16 Jun. 1971 - 17 Apr. 1972
Richard M. Hearsey Wright-Patterson AFB, Ohio AFAPL Jun. 1972 196 p refs
(Contract F33615-71-C-1751; AF Proj. 3066; AF Proj. 7065)
(AD-744503; UDRI-TR-72-21-Vol-2; AFAPL-TR-72-43-Vol-2)
Avail: NTIS CSCL 21/5

A pair of special-purpose computer programs have been written for the analysis of axial compressor aerodynamic test data. The axisymmetric flow of a thermally-perfect compressible fluid is assumed, and the streamline curvature method of solution is employed. By optionally incorporating details of the blade geometry in the input data, a detailed account of the flow through the blading may be obtained. A unique feature of the analysis is the option to determine annulus blockage due to boundary layers and blade wakes by utilizing experimental wall static pressure readings in addition to the usual traverses of total pressures and temperature. This second volume of two that describe the programs contains program and sample input data listings, and the corresponding computed results. Author (GRA)

N72-32757# Joint Publications Research Service, Arlington, Va.
THEORY OF RAMJET AND ROCKET-RAMJET ENGINES, PART 1
V. S. Zuyev and V. S. Makaron 20 Sep. 1972 242 p refs Transl. into ENGLISH of the book "Teoriya Pryamotochnykh i Raketno-Pryamotochnykh Dvigateley" Moscow, Mashinostroyeniye Press, 1971 367 p
(JPRS-57062-1-Pt-1) Avail: NTIS HC $14.25

An analysis of various air-breathing jet engine systems

based on the general thermodynamic approach is presented. A study was made of the basic laws of the behavior of the characteristics of RRJE (rocket-ramjet engines with a single mixing-combustion chamber), SSRJE (supersonic ramjet engines) and HSRJE (hypersonic ramjet engines). A method of calculating the engine characteristics considering the physical-chemical conversions in the gases and high temperatures is presented. The theory and principles of organizing the operating process of the supersonic diffuser, the nozzle, the straight-flow combustion chambers and the jet pump (ejector) are discussed. Author

N72-32758# Joint Publications Research Service, Arlington, Va.
THEORY OF RAMJET AND ROCKET-RAMJET ENGINES, PART 2
V. S. Zuyev and V. S. Makaron 20 Sep. 1972 248 p refs Transl. into ENGLISH of the book "Teoriya Pryamotochnykh i Raketno-pryamotochnykh Dvigateley" Moscow, Mashinostroyeniye Press, 1971 367 p
(JPRS-57062-2-Pt-2) Avail: NTIS HC $14.50
For abstract see N72-32757

N72-32759*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
QUASI-THREE-DIMENSIONAL CALCULATION OF VELOCITIES IN TURBOMACHINE BLADE ROWS
Theodore Katsanis 1972 20 p refs Proposed for Presentation at Winter Ann. Meeting of the ASME, New York, 12-16 Nov. 1972
(NASA-TM-X-67959; E-6666) Avail: NTIS HC $3.00 CSCL 21E

A practical way of obtaining an approximation to a three dimensional flow is to combine several two-dimensional solutions (quasi-three-dimensional solution). Three basic types are discussed of two-dimensional solutions (meridional, blade-to-blade, and channel) and several ways of combining them. A centrifugal impeller is analyzed as an example. All recommended methods are based on available NASA general purpose computer programs. Author

N72-32760*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPUTTERING HOLES WITH ION BEAMLETS Patent Application
David C. Byers and Bruce A. Banks, inventors (to NASA) Filed 27 Sep. 1972 8 p
(NASA-Case-LEW-11646-1; US-Patent-Appl-SN-292686) Avail: NTIS HC $3.00 CSCL 21C

Ion beamlets of predetermined configurations are formed by shaped apertures in the screen grid of an ion thruster. A plate is placed in front of the screen grid holes and attached to the accelerator grid. When the ion thruster is operated, holes having the configuration of the beamlets are sputtered through the plate. NASA

N72-32761*# Marquardt Corp., Van Nuys, Calif.
TECHNOLOGY DEVELOPMENT OF A BIOWASTE RESISTOJET, VOLUME 2
D. G. Phillips Jun. 1972 135 p refs
(Contract NAS1-9474)
(NASA-CR-112150) Avail: NTIS HC $8.75 CSCL 21I

The thruster development effort of the biowaste resistojet program is reported. Under this program, several variations of the concentric tube resistojet were built and tested. Because of the corrosive nature of the biowaste gases available for propellants, thruster effort was concentrated on the use of noble metals (platinum and its alloys) for the critical center tube heating element. This tube must operate at high temperatures. Initially the biowaste gases were projected to be CO2, CH4, H2O or H2 with only very small amounts of O2 or N2. However, during 1971, results from experimental life support tests indicated that the oxygen content would probably be in the range from 0.5 to 1.0%. To achieve the desired high specific impulses, metal temperatures as high as 1700 K (3060 R) were considered desirable goals. The first thruster, designated Mark 1, employed the alloy platinum-rhodium for the center tube. Although this material was oxidation resistant and had high strength relative to pure platinum, experimental materials tests showed that this alloy suffered from carbonyl reactions when tested on pure CO2. These reactions resulted in a depletion of rhodium and significantly weakened the tubes. The next series of thrusters were designated Mark 2 and employed platinum-iridium for the center tubes. Author

N72-32762*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DRIVE TURBINE SYSTEM FOR 20-INCH TURBOFAN SIMULATORS. 2: CORE TURBINE DESIGN
Warren J. Whitney Sep. 1972 20 p refs
(NASA-TM-X-68130; E-7121) Avail: NTIS HC $3.00 CSCL 21E

Drive-turbines for a given set of 20-inch turbo-fan simulators are described. The simulators had both single-stage and two-stage fans that had design pressure ratios as low as 1.25 and as high as 3.0. The desired objective of the study was to be able to drive all of the single-stage fans with one core turbine and to drive all of the two-stage fans with this same core turbine in combination with a duct turbine. The core turbine is described. Included are the design operating conditions, design velocity diagram and a power-speed envelope determined by an off-design performance procedure. Also discussed is the adaption and scaling of an existing turbine design to this particular application. Author

N72-32763*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A CONCEPT FOR JET NOISE SUPPRESSION FOR AN AFTERBURNING TURBOJET ENGINE
Rone E. Chambellan and Robert J. Turek Oct. 1972 19 p refs
(NASA-TM-X-68144; E-7167) Avail: NTIS HC $3.00 CSCL 21E

A conceptual design of an afterburner system for turbojet engines which may reduce the jet exhaust noise by approximately 10 decibels is presented in this report. The proposed system consists of an array of swirl-can combustors and jet dividing nozzle tubes. The nozzle tubes translate axially upstream of the swirl cans when not in use. Results of preliminary design calculations and photographs of a kinematic model as applied to a hypothetical turbojet engine are presented. Author

N72-32764*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECTIVE SPECIFIC IMPULSE OF EXTERNAL NUCLEAR PULSE PROPULSION SYSTEMS
Thaine W. Reynolds Washington Sep. 1972 28 p refs
(NASA-TN-D-6984; E-7013) Avail: NTIS HC $3.00 CSCL 21F

An investigation of a simple self-similar flow model for an external nuclear pulse propulsion system indicates that to achieve the high effective specific impulse of such a system three principal factors are required. The are (1) attaining pulses of optimum energy, (2) attaining good propellant collimation, and (3) using an ablative material for the pusher surface which has high absorptivity for radiant energy at the propellant stagnation temperature. Author

N72-32765*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AERODYNAMIC AND ACOUSTIC PERFORMANCE OF TWO CHOKED FLOW INLETS UNDER STATIC CONDITIONS
Brent A. Miller and John M. Abbott Washington Sep. 1972 25 p refs
(NASA-TM-X-2629; E-7008) Avail: NTIS HC $3.00 CSCL 21H

Tests were conducted to determine the aerodynamic and acoustic performance of two choking flow inlets under static

conditions. One inlet choked the flow in the cowl throat by an axial translation of the inlet centerbody. The other inlet employed a translating grid of airfoils to choke the flow. Both inlets were sized to fit a 13.97 cm diameter fan with a design weight flow of 2.49 kg/sec. The inlets were operated in both the choked and unchoked modes over a range of weight flows. Measurements were made of inlet pressure recovery, flow distortion, surface static pressure distribution, and fan noise suppression. Choking of the translating centerbody inlet reduced blade passing frequency noise by 29 db while yielding a total pressure recovery of 0.985. Noise reductions were also measured at 1/3-octave band center frequencies of 2500, 5000, and 20,000 cycles. The translating grid inlet gave a total pressure recovery of 0.968 when operating close to the choking weight flow. However, an intermittent high intensity noise source was encountered with this inlet that precluded an accurate measurement of inlet noise suppression. Author

N72-32766*# Brunswick Corp., Lincoln, Nebr. Technical Products Div.
FILAMENT-WOUND GRAPHITE/EPOXY ROCKET MOTOR CASE
W. D. Humphrey and W. W. Schmidt 15 Jul. 1972 53 p Prepared for JPL
(Contract NAS7-100; JPL-953210)
(NASA-CR-128417; BC-8845-FAB) Avail: NTIS HC $4.75 CSCL 21H

The fabrication procedures are described for a filament-wound rocket motor case, approximately 56 cm long x 71 cm diameter, utilizing high tensile strength graphite fibers. The process utilized Fiberite Hy-E-1330B prepreg tape which consists of Courtaulds HTS fibers in a temperature-sensitive epoxy matrix. This fabrication effort, with resultant design, material and process recommendations, substantiates the manufacturing feasibility of graphite/epoxy rocket motor cases in the 56 cm x 71 cm size range. Author

N72-32767*# Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics Operations Div.
HYDROCARBON POLYMERIC BINDER FOR ADVANCED SOLID PROPELLANT Quarterly Report, 1 Feb. - 30 Apr. 1971
James E. Potts, ed., A. C. Ashcraft, Jr., and E. W. Wise 15 May 1971 44 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951210)
(NASA-CR-128414) Avail: NTIS HC $4.25 CSCL 21I

Various experimental factors were examined to determine the source of difficulty in an isoprene polymerization in the 5-gallon reactor which gave a non-uniform product of low functionality. It was concluded that process improvements relating to initiator and monomer purity were desirable, but that the main difficulty was in the initiator feed system. A new pumping system was installed and an analog simulation of the reactor, feed system and initiator decomposition kinetics was devised which permits the selection of initial initiator concentrations and feed rates to use to give a nearly uniform initiator concentration throughout a polymerization run. An isoprene polymerization was run in which the process improvements were implemented. Author

N72-32768# ARO, Inc., Arnold Air Force Station, Tenn.
MEASUREMENT OF POLLUTANT EMISSIONS FROM AN AFTERBURNING TURBOJET ENGINE AT GROUND LEVEL. PART 1: PARTICULATE EMISSIONS Final Report, 23 Mar. - 13 May 1971
J. W. Gearhart and J. A. Benek AEDC Jun. 1972 54 p refs
(Contract F40600-72-C-0003; AF Proj. 3066; ARO Proj. RW-5139)
(AD-744048; ARO-ETF-TR-72-29-Pt-1; AEDC-TR-72-64-Pt-1) Avail: NTIS CSCL 13/2

Quantitative radiance measurements from NASA's ATS-3 geosynchronous satellite have been used to develop and test a statistical forecast method to predict air terminal weather over the very short range (0-6 hours) time period. Results from more than 800 hourly weather situations at a wide range of U.S. weather stations show that the parameters of ceiling and total opaque cloud cover can be specified or predicted with skill, exceeding persistence forecasts for time periods greater than two hours. Author (GRA)

N72-32769# ARO, Inc., Arnold Air Force Station, Tenn.
A KINETIC MODEL FOR TWO PHASE FLOW IN HIGH TEMPERATURE EXHAUST GAS COOLERS Final Report
John M. Pelton and C. E. Willbanks AEDC Jun. 1972 84 p refs
(Contract F40600-72-C-0003; ARO Proj. RW0856; ARO Proj. RW2116)
(AD-744514; ARO-ETF-TR-72-68; AEDC-TR-72-89) Avail: NTIS CSCL 21/8

An analytical model was developed to describe the thermodynamic and fluid dynamic processes in an exhaust gas cooler employing liquid water injection. The model is based on the solution of the equations of conservation of species, momentum, and energy for the system and the equations for the exchange of these quantities between liquid and gaseous phases. These equations are programmed for solution on an IBM 360 computer. The predictions of the model are compared with measured data from a series of turbojet tests in the Propulsion Development Test Cell (T-1) spray cooler. Author (GRA)

N72-32770# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TEST STAND FOR STUDY OF OSCILLATIONS OF TURBINE ROTORS IN BEARINGS WITH GAS HYDRODYNAMIC LUBRICATION
A. V. Palladii, G. A. Pospelov, and E. I. Spektor 5 Apr. 1972 9 p refs Transl. into ENGLISH from Gaz. Smazka Podshipnikov (USSR), no. 9, 1968 p 283-288
(AF Proj. 7343)
(AD-744265; FTD-HC-23-111-72) Avail: NTIS CSCL 21/5

A test stand was designed for investigations of rotor vibrations caused by a misalignment, by resonant phenomena, and by the loss of stability in the lubricating layer. Antifriction bearings and different slide bearings with an oil or gas lubricant can be used as rotor supports. One support of the test stand is adjustable, and a set of rotors with detachable disks is provided. The stand is suitable for studying rotors up to 1240 mm long and 350 mm in diameter. It can also be used to study vibrations caused by misalignment of the bearings, and to study the external damping, the centering of bushings, and the possibility of modeling the turbine flow passage. Author (GRA)

N72-32771# Solar Aircraft Co., San Diego, Calif.
ANALYTICAL, EXPERIMENTAL AND MECHANICAL EVALUATION OF FREE ROTATING VANELESS DIFFUSERS Final Report, Jan. 1971 - Feb. 1972
C. Rodgers, ed. and H. Mnew May 1972 106 p refs
(Contract DAAK02-71-C-0189; DA Proj. 1G6-63702-DG-11)
(AD-744475; ER-2391) Avail: NTIS CSCL 21/5

Experimental testing of a model free rotating vaneless diffuser rig to determine diffuser loss coefficients and static pressure recovery under braked and free rotating conditions was conducted. The rig was operated at entry Mach numbers up to unity with both vaned and vaneless diffusers installed downstream. Two rotating diffuser widths were tested. A significant improvement in diffuser performance was achieved under free rotating conditions, even though large wakes generated by upstream stationary swirl nozzles were present. Overall static pressure recovery for the complete diffusion system increased approximately 20%, at free rotating conditions corresponding to a tangential velocity ratio (diffuser/incident stream) of 0.43. The total pressure loss reduction between braked and rotating conditions correlated with theoretical studies. A mechanical design study to examine methods of integrating the rotating diffuser into a complete gas turbine was also conducted and a feasible preliminary design identified. Author (GRA)

N72-32772# Defence Research Information Centre, Orpington (England).
ANALYSIS OF THE CONDITIONS OF OPERATION OF GAS TURBINE ROTOR BEARING FROM THE RESULTS OF COMPUTER CALCULATIONS OF THEIR THERMAL REGIMES
V. M. Demidovich and V. A. Chernoglazov Jun. 1972 10 p ref Transl. into ENGLISH from Tr. Seriya Aviats Divgateli (USSR), v. 110, 1969 p 122-127
(AD-744297; DRIC-Trans-2779) Avail: NTIS CSCL 21/5

In order to facilitate the practical application of methods of calculation of the thermal regime, and for speedy graphical analysis of the influence of basic parameters on the thermal regime, the authors conceived the idea of a large series of thermal calculations for bearings (a series of 4000) on the E.TS.V.M. 'Nairi'. The use of nomograms in the analysis of the effect of various parameters on the thermal regime of gas turbine rotor bearings can be helpful in the design of new bearing assemblies and oil systems for gas turbine engines. GRA

N72-32773# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THEORY AND DESIGN OF AIRCRAFT TURBOMACHINES
K. V. Kholshchevnikov 29 Feb. 1972 981 p refs Transl. into ENGLISH from the monograph "Teoriya i Raschet Aviatsionnykh Lopatochnykh Mashin" (USSR), 1970 p 1-610
(Contract F33657-71-D-0057; AF Proj. 6040)
(AD-744183; FTD-HC-23-754-71) Avail: NTIS CSCL 21/5

The textbook examines the fundamentals of turbomachine theory and also the configurations and operating principles of turbomachines of various types: axial, centrifugal, and mixed-flow compressors and axial turbines. Considerable attention is devoted to turbine and compressor performance and regulation and also the problems of matching their parameters in the gas turbine engine system. The text is intended for students of aviation colleges and schools. It may also be used by engineering and technical personnel working in aircraft engine construction. Author (GRA)

N72-32774# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering.
AN ANALYTICAL STUDY OF FLOW LOSSES THROUGH A TWO DIMENSIONAL TURBINE CASCADE WITH BOUNDARY LAYER INJECTION
W. Tabakoff and R. Earley Apr. 1972 53 p refs
(Grant DA-ARO(D)-31-124-71-G15)
(AD-744535; Rept-72-26; AROD-10223-1-E) Avail: NTIS CSCL 21/5

A method for determining the performance of a two-dimensional turbine cascade with boundary layer injection is developed using existing incompressible boundary layer approximate solutions with a new formulation for the injection. The overall cascade loss includes friction and wake mixing losses. The results of the analysis are compared with experimentally obtained data as a check of the validity of the new analytical method. Author (GRA)

29 SPACE RADIATION

Includes cosmic radiation; solar flares; solar radiation, and Van Allen radiation belts. For related information see also: 13 Geophysics; and 24 Physics, Atomic, Molecular, and Nuclear.

N72-32775*# Texas A&M Univ., College Station. Dept. of Physics.
AN EXPLICIT FORM OF THE MIE PHASE MATRIX FOR MULTIPLE SCATTERING CALCULATIONS IN THE I, Q, U, AND V REPRESENTATION
George W. Kattawar, Stephen J. Hitzfelder, and Judith Binstock [1971] 25 p refs
(Grant NGR-44-001-117)
(NASA-CR-128174) Avail: NTIS HC $3.25 CSCL 03B

An explicit expression is obtained for the phase matrix in the I, Q, U, and V Stokes vector representation for a system containing a polydispersion of spherical particles. All of the symmetry relations derived by Hovenier using general arguments are established explicitly. Convenient algorithms are given for the computation of the phase matrix for a spherical polydispersion. Since this theory is so vitally important in radiative transfer, many researchers will need to compute these functions for realistic aerosols distributions. Therefore, results are presented for a haze L distribution so that other researchers will have a way of checking their programs which compute these quantities. Author

N72-32776*# Maryland Univ., College Park. Space Physics Group.
MODULATION OF COSMIC RAY ELECTRONS
James A. Earl Jul. 1972 15 p refs
(Grant NGR-21-002-066)
(NASA-CR-128282; TR-72-080) Avail: NTIS HC $3.00 CSCL 20H

The origin and variations of the steep spectrum of electrons observed below 20 MeV is explained by a simple model in which the spectrum of interplanetary cosmic rays is decomposed, at low energies, into two independently varying components. Author

N72-32777*# California Inst. of Tech., Pasadena.
TRANSPORT OF SOLAR FLARE PROTONS: COMPARISON OF A NEW ANALYTIC MODEL WITH SPACECRAFT MEASUREMENTS
J. E. Lupton and E. C. Stone Jul. 1971 7 p refs Sponsored by NASA
(NASA-CR-128295; SRL-71-3) Avail: NTIS HC $3.00 CSCL 03B

An analytic solution was obtained to the complete Fokker-Planck equation including the effects of convection, interplanetary deceleration and acceleration, corotation, and anisotropic diffusion. The solution yields a time to maximum for the particle flux of about 10 h and an exponential decay time of about 5 h. Several solar flare particle events were observed with the solar and galactic cosmic ray experiment on OGO-6. Comparisons of the calculated time dependence of the fluxes with these observations of 1 to 70 MeV protons show that the model adequately describes both the rise and decay times. Author

N72-32778*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EQUATORIAL IONOSPHERIC ABSORPTION DURING HALF A SOLAR CYCLE (1964-1970)
S. Gnanalingam Jul. 1972 45 p refs Submitted for publication
(NASA-TM-X-66029; X-625-72-276) Avail: NTIS HC $4.25 CSCL 04A

An extensive series of vertical incidence absorption measurements made at an equatorial station is analyzed in detail for a better understanding of the lower ionosphere. A quantitive empirical relationship is derived between absorption and 1 to 8 A solar flux for moderate levels of solar activity. It is shown that the threshold flux for D region modification, at a solar zenith angle of 10 deg, is approximately 0.0005 erg/sq/cm/sec. Attention is drawn to the incidence of days of high absorption even in the absence of solar X-ray activity. Available evidence points to variability of the order of 10 to 40% in the intensity of the solar Lyman alpha radiation as the most likely cause of these unusual, though infrequent, enhancements in absorption. Author

N72-32779*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ENERGETIC ELECTRONS FROM SOLAR FLARES AND ASSOCIATED TYPE 3 RADIO BURSTS FROM METRIC TO HECTOMETRIC WAVE FREQUENCIES
Kunitomo Sakurai (Maryland Univ.) Sep. 1972 14 p refs
(NASA-TM-X-66031; X-693-72-342) Avail: NTIS HC $3.00 CSCL 03B

Distinct Kev electron events as observed by satellites near the earth are, in general, associated with solar flares which are accompained by the emission of both metric and hectometric type 3 radio bursts. The positions of these flares are mainly on the western hemisphere of the sun. These results show that Kev electrons propagate under the control of the magnetic field in the interplanetary space and that, while propagating through this space, these electrons excite type 3 radio bursts from metric to hectometric wave frequencies. Emission characteristics of hectometric type 3 bursts are briefly considered in relation to the positions of associated flares. Author

N72-32780# National Environmental Satellite Service, Washington, D.C.
SATELLITE MEASUREMENTS OF AEROSOL BACKSCATTERED RADIATION FROM THE NIMBUS F EARTH RADIATION BUDGET EXPERIMENT
H. Jacobowitz, W. L. Smith, and A. J. Drummond (Eppley Lab., Inc.) Aug. 1972 12 p refs Presented at the Am. Meteorol. Soc. and Air Pollution Control Assoc. Conf. on Air Pollution Meteorol., Raleigh, N. C., 5-9 Apr. 1971
(NOAA-TR-NESS-60) Avail: SOD $0.25

Instruments are considered which are used to investigate the backscatter from atmospheric aerosols together with accurate quantitative determinations of earth atmosphere radiation budgets on both synoptic and planetary scales. The possibility is discussed of obtaining measurements of the degree of polarization of backscattered radiation in the visible spectrum as part of a future satellite project that could be based upon the earth radiation budget experiment. These measurements, together with radiation intensity determinations, might permit diagnosing particulate pollutants (aerosols) and monitoring their transport. Simultaneous fixed (wide-angle) and scanning (narrow-angle) integral short-wavelength and long-wavelength outgoing energy flux determinations will permit detailed study of the regional and global influence of atmospheric aerosol pollutants on the heat budget. In 1974, the radiometer is to fly aboard the Nimbus F satellite. Author

N72-32781*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CALCULATIONS OF SYNCHROTRON EMISSION FROM THE TERRESTRIAL RADIATION BELTS
Richard Johnson Aug. 1972 36 p refs
(NASA-TM-X-66015; X-693-72-254) Avail: NTIS HC $4.00 CSCL 03B

A theoretical model was developed to allow for the calculation of the synchrotron emission arising from high energy electrons trapped in the Van Allen belts of a planet with a dipole magnetic field. The model is general enough to allow for the calculation of the intensity of radiation received by an observer at any distance from and any latitude about the planet. The model is used to compute the emission from the earth's Van Allen belts that one should expect at various latitudes at a distance of 1.92 earth radii, the position of the Radio Astronomy Explorer satellite that was launched in 1968, for the frequencies 1.3 MHz and 2.2 MHz. Author

N72-32782*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MODULATION OF LOW ENERGY COSMIC RAYS Ph.D. Thesis - Maryland Univ.
James W. Sari Aug. 1972 121 p refs Submitted for publication
(Grant NGL-21-002-033)
(NASA-TM-X-66019; X-692-72-309) Avail: NTIS HC $8.25 CSCL 03B

The power spectrum of the interplanetary magnetic field was tested, as well as the power spectrum-cosmic diffusion ray coefficient relation at low energies. A first order perturbation solution of the Fokker-Planck equation governing the diffusion, convection, and adiabatic deceleration of galactic cosmic rays in the solar medium was found to relate intensity fluctuations of low energy cosmic rays to local changes in the propagation parameters. Diffusion coefficients and their day to day variations were calculated from interplanetary magnetic field data obtained by Pioneer 6 in 1965/1966. These are compared to simultaneous observations by IMP 3 of the proton flux in three energy channels (20 to 40, 40 to 60, 60 to 80 MeV). Author

N72-32783*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LATITUDE AND LOCAL TIME DEPENDENCE OF PRECIPITATED LOW ENERGY ELECTRONS AT HIGH LATITUDES
Georg Gustafsson Aug. 1972 45 p refs
(NASA-TM-X-66035; X-645-72-293) Avail: NTIS HC $4.25 CSCL 03B

Data from particle detectors on board the satellite OGO-4 were used to study the precipitation of electrons in the energy range 0.7 to 24 keV. The latitude dependence of these particles in the local time region from midnight to dawn was investigated in detail. The analysis shows that the precipitation of particles of energies 2.3 to 24 keV is centered at an invariant latitude of about 68 deg at midnight with a clear shift in latitude with increasing local time and this shift is more pronounced for lower energies. The highest fluxes of particles in this energy interval are measured at midnight and they decrease rapidly with local time. The data in the energy range 2.3 to 24 keV support a theory where particles are injected in the midnight region from the tail gaining energy due to a betatron process and then drift eastwards in a combined electric and magnetic field. The main part of the electrons at 0.7 keV show a different behavior. They seem to undergo an acceleration process which is rather local, sometimes giving field aligned fluxes which may be superimposed on the background precipitation. Author

N72-32784# American Science and Engineering, Inc., Cambridge, Mass.
OBSERVATIONS OF GALACTIC X-RAY SOURCES
Herbert Gursky Aug. 1972 70 p refs Submitted for publication
(ASE-3066) Avail: NTIS HC $5.50

Lectures on galactic X-ray sources are presented which were given at the Summer School of Theoretical Physics at Les Houches, France in August, 1972. Topics discussed include: observational techniques (proportional counters, mechanical collimators, statistics, and the UHURU satellite); distribution of sources in the galaxy (longitude distribution, maximum and minimum luminosity, spectral content of the radiation, effect of anisotropic X-ray emission); and properties of individual X-ray sources (Scorpius X-1, Cygnus X-1 and X-2, Centaurus X-3, Hercules X-1, and other sources). K.P.D.

N72-32785*# National Aeronautics and Space Administration, Washington, D.C.
ROTATING DISCONTINUITIES IN THE SOLAR WIND
K. G. Ivanov Jun. 1972 11 p refs Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 11, no. 5, 1971 p 765-770
(NASA-TT-F-14473) Avail: NTIS HC $3.00 CSCL 03B

Conditions for rotating discontinuities in plasma with anisotropic pressure are studied on the basis of the most simple closed system of hydrodynamic equations for rarified plasma. It was ascertained that for anisotropic rotating discontinuities, differing from isotropic ones, intermittent changes in the module of the magnetic field H are possible, and tangential components of H on the front are always colinear. Through analysis of simultaneous plasma and magnetic data, it was shown that 10 out of 11 large discontinuities of velocity observed by Explorer-34 in 1967 may be considered rotating discontinuities and not of the tangential type since the specific conditions for rotating discontinuities H sub n (V sub t) = (H sub t) V sub n, connecting jumps in the tangential components of solar wind flux velocity with the interplanetary magnetic field are satisfied in them. Author

N72-32786*# Aeronautical Research Associates of Princeton, Inc., N.J.
PHOTOIONIZATION MEASUREMENT STUDY Final Report, 26 Feb. 1971 - 25 Feb. 1972
Guido Sandri Feb. 1972 41 p refs
(Contract NAS5-11402)
(NASA-CR-130064) Avail: NTIS HC $4.25 CSCL 03B

An analysis was conducted of a gas window photoionization device for studying cosmic X-rays in the region 20 eV to 1 keV. The detecting element is an argon proportional counter whose window is a two-dimensional supersonic gas jet. Spectroscopic features of the incoming radiation can be determined by the choice of gas forming the jet (as well by the fluid dynamic parameters of the flow). The choice of gas can be made from pure substances and/or compounds with Z between 1 and 10. The counter walls can be prepared for selective analysis of the extreme ultraviolet radiation. Author

N72-32787*# National Aeronautics and Space Administration, Washington, D.C.
STUDY OF ANGULAR AND SPECTRAL DISTRIBUTION OF EARTH'S RADIATION IN THE INFRARED FIELD OF SPECTRUM CONDUCTED FROM THE EARTH'S EXPLORER KOSMOS-45
P. A. Bazhulin, A. V. Karmashev, and M. N. Markov Jun. 1972 38 p refs Transl. into ENGLISH from Kosm. Issled. (USSR), v. 4, no. 4, Jul. - Aug. 1966 p 601-618
(NASA-TT-F-14442) Avail: NTIS HC $4.00 CSCL 03B

The method and results of studies of earth radiation obtained during the flight of the Cosmos 45 are described. Data on angular, spectral, and spatial distributions of thermal radiation flow and earth albedo are cited. Infrared radiation of the ionosphere in the 0.8 to 4.5 and 4.5 to 8.5 micrometer fields was investigated on the day and night sides of the earth. The presence of water vapor at altitudes of about 100 km was established above large water-covered areas on the earth.
Author

N72-32788# Central Research Inst. for Physics, Budapest (Hungary).
TRANSIENT MODULATION
Antal J. Somogyi 1971 19 p refs Presented at the 12th Intern. Conf. on Cosmic Rays, Hobart, Australia, 16-26 Aug. 1971
(KFKI-71-79; Conf-710807-2) Avail: AEC Depository Libraries

A summary is presented of papers dealing with the problems of Forbush decreases or cosmic ray intensity variations due to large scale quasi-persistent azimuthal asymmetry in the solar wind. Forbush decrease data include all kinds of cosmic ray storms and azimuthal asymmetry variations cover the 27-day variation and other recurrent variations with a time scale more than a few days and less than a few months. In the field of modulation dynamics, the general character of N-S asymmetries is brought out in the fact that in almost all cases in which the equilibrium of the interplanetary space is perturbed, a marked gradient perpendicular to the ecliptic plane is produced. There is some indication that this holds not only in violent cases such as shock waves but also in weak perturbations like those giving rise to a 27-day wave. NSA

N72-32789# California Univ., Berkeley. Space Sciences Lab.
[SUPERGRANULATION AND 5-MINUTE OSCILLATIONS IN SOLAR ATMOSPHERE] Final Report, 1 Oct. 1970 - 31 Aug. 1971
1971 8 p refs
(Contract N00014-69-A-0200-1040; NR Proj. 021-109)
(AD-740233) Avail: NTIS CSCL 03/2

In the early 1960's two new types of motion in the sun's atmosphere were discovered, the 5-minute oscillations and the supergranulation. The 5-minute oscillations consist of a predominantly vertical hydrodynamic wave motion in the photosphere and chromosphere with amplitudes around 500 m/sec. The supergranulation consists of a series of convective cells, 30,000 km in diameter, in which material rises at the center, flows horizontally outward, and falls at the boundaries. The horizontal motion in the supergranulation was clearly observed, but its vertical motion was observed only marginally at best. The observations described in the report were made at the Mt. Wilson Observatory 150-foot solar telescope. Author (GRA)

N72-32790# Harvard Coll. Observatory, Cambridge, Mass.
RESEARCH DIRECTED TOWARD THE OBSERVATION AND INTERPRETATION OF SOLAR PHENOMENA Final Report, 1 Nov. 1968 - 31 Dec. 1971
Barbara Bell and Donald H. Menzel Jan. 1972 22 p refs
(Contract F19628-69-C-0077; AF Proj. 7649)
(AD-741783; AFCRL-72-0094) Avail: NTIS CSCL 03/2

The first section summarizes the theoretical studies carried out on sunspot models, cosmic electrodynamics, and atomic theory. The second section describes coronal studies at eclipse, supported in part by this contract but primarily from other sources. The third section reviews a study of some statistical properties of sunspot cycles, with emphasis on their variation from cycle to cycle, with evidence for long-period fluctuation in solar activity which is not confined to the usual indices of spottedness. The concluding section is concerned primarily with long-term solar variations and climate history, including some research directed toward fuller identification of the climate fluctuations of the past century. Author (GRA)

N72-32791# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ON THE CLASSIFICATION, DISTRIBUTION, AND INTERPRETATION OF SOLAR MICROWAVE BURST SPECTRA AND RELATED TOPICS
John P. Castelli and Donald A. Guidice 17 Jan. 1972 66 p refs
(ILIR-00-01)
(AD-741750; AFCRL-ERP-381; AFCRL-72-0049) Avail: NTIS CSCL 03/2

The report discusses the classification, distribution, and interpretation of the peak flux-density spectra of solar radio bursts in decimeter-centimeter range (1 m to 1 cm). It is based on observations at discrete frequencies between 245 and 35,000 MHz taken at the Sagamore Hill Radio Observatory, Hamilton, Mass., through the years 1966-1969. The peak flux-density spectra of over 2000 radio bursts were used in this investigation. Author (GRA)

N72-32792# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
SOLAR MAPPING AT THE HAYSTACK OBSERVATORY ON THE WAVELENGTH OF 3.8 cm
David W. Richards 1 Feb. 1972 30 p refs
(AF Proj. 4643)
(AD-742235; AFCRL-72-0090; AFCRL-PSRP-479) Avail: NTIS CSCL 03/2

The report discusses a program of solar mapping conducted at the Haystack Observatory in 1970-71. The technical problems encountered in data acquisition and reduction are considered in some detail, and the results presented in a set of 22 brightness-temperature and polarization maps of the solar disk. Preliminary comparisons are made of active region fluxes with polarization and with fluxes from the Stanford University 3.3 GHz Maps. Author (GRA)

N72-32793# Comstock and Wescott, Inc., Cambridge, Mass.
INSTRUMENTATION FOR STUDIES OF SOLAR xuv RADIATION Final Report, 1 Jul. 1968 - 31 Dec. 1971
Joseph P. Padur, John F. McGrath, Jr., and Pieter R. Wiederhold 10 Feb. 1972 86 p refs
(Contract F19628-68-C-0239; AF Proj. 6688)
(AD-743835; AFCRL-72-0133) Avail: NTIS CSCL 04/1

The report describes the design, development and construction of grazing-incidence telemetering monochromators

used in rocket experiments to obtain measurements of solar extreme ultraviolet and soft X-ray (XUV) radiation in the upper atmosphere. The report also discusses the intensity and wavelength calibration of these instruments to allow flight data to be converted to absolute values of solar radiation fluxes as a function of wavelength, and the laboratory calibration instrumentation used to obtain this information. Finally, the report discusses the field services and rocket launchings involving the flight instruments developed under this contract.
Author (GRA)

30 SPACE SCIENCES

Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbit and trajectory. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

N72-32794*# California Inst. of Tech., Pasadena. Seismological Lab.
ACCRETION PROCESS OF THE MOON
Hitoshi Mizutani, Takahumi Matsui (Tokyo Univ.), and Hitoshi Takeuchi (Tokyo Univ.) [1972] 30 p refs
(Grant NGL-05-002-069)
(NASA-CR-125693; Contrib-2104) Avail: NTIS CSCL 03B

Recent geochemical and geophysical data suggest that the initial temperature of the moon was strongly peaked toward the lunar surface. To explain such an initial temperature distribution, a simple model of accretion process of the moon is presented. The model assumes that the moon was formed from the accumulation of the solid particles or gases in the isolated, closed cloud. Two equations are derived to calculate the accretion rate and surface temperature of the accreting moon. Numerical calculations are made for a wide range of the parameters particle concentration and particle velocity in the cloud. A limited set of the parameters gives the initial temperature profiles as required by geochemical and geophysical data. These models of the proto-moon cloud indicate that the lunar outermost shell, about 400 km thick, was partially or completely molten just after the accretion of the moon and that the moon should have been formed in a period shorter than 1000 years. If the moon formed at a position nearer to the earth than its present one, the moon might have been formed in a period of less than one year. Author

N72-32795*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. VOLUME 1: MISSION ANALYSIS Final Report
W. L. Steinwachs May 1972 92 p
(Contract NAS9-12068)
(NASA-CR-128203; MSC-04482-Vol-1; SD-72-SA-0007-Vol-1) Avail: NTIS HC $6.75 CSCL 22A

The final report of the orbital operations study and a summary of the 25 elements in the study inventory are presented. Fourteen interfacing activities are defined. Eleven mission models encompassing all potential interfacing element pairs and interfacing activities are included. Author

N72-32796*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATION STUDY. VOLUME 2: INTERFACING ACTIVITIES ANALYSIS. PART 1: INTRODUCTION AND SUMMARY Final Report
N. R. Anderson et al May 1972 172 p
(Contract NAS9-12068)
(NASA-CR-115721; MSC-04482-Vol-2-Pt-1; SD-72-SA-0007-VOL-2-Pt-1) Avail: NTIS HC $10.75 CSCL 22A

The summary of the interfacing activity analyses for the orbital operations study is presented. The significant analyses are grouped into categories as follows: (1) structural and mechanical activity, (2) data management, and (3) support operations. Specific subjects concerning payload deployment, communications, rendezvous, and stationkeeping are discussed. Author

N72-32797*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. VOLUME 2: INTERFACING ACTIVITIES ANALYSIS. PART 2: STRUCTURAL AND MECHANICAL GROUP Final Report
H. L. Mattson, A. Gianformaggio, and N. R. Anderson May 1972 354 p
(Contract NAS9-12068)
(NASA-CR-115722; MSC-04482-Vol-2-Pt-2; SD-72-SA-0007-Vol-2-Pt-2) Avail: NTIS HC $19.75 CSCL 22A

The activities of the structural and mechanical activity group of the orbital operations study project are discussed. Element interfaces, alternate approaches, design concepts, operational procedures, functional requirements, design influences, and approach selection are presented. The following areas are considered: (1) mating, (2) orbital assembly, (3) separation, EOS payload deployment, and EOS payload retraction. Author

N72-32798*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. VOLUME 2: INTERFACING ACTIVITIES ANALYSES. PART 3: DATA MANAGEMENT ACTIVITY GROUP Final Report
E. Mehrbach and S. H. Turkel May 1972 249 p
(Contract NAS9-12068)
(NASA-CR-115723; MSC-04482-Vol-2-Pt-3; SD-72-SA-0007-Vol-3-Pt-3) Avail: NTIS HC $14.50 CSCL 22A

A summary of the findings of the data management group of the orbital operations study is presented. Element interfaces, alternate approaches, design concepts, operational procedures, functional requirements, design influences, and approach selection are described. The following interfacing activities are considered: (1) communications, (2) rendezvous, (3) stationkeeping, and (4) detached element operations. Author

N72-32799*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. VOLUME 2: INTERFACING ACTIVITIES ANALYSIS. PART 4: SUPPORT OPERATIONS ACTIVITY GROUP Final Report
W. L. Steinwachs, J. W. Patrick, D. M. Galvin, and S. H. Turkel May 1972 255 p
(Contract NAS9-12068)
(NASA-CR-115724; MSC-04482-Vol-2-Pt-4; SD-72-SA-0007-Vol-2-Pt-4) Avail: NTIS HC $14.75 CSCL 22A

The findings of the support operations activity group of the orbital operations study are presented. Element interfaces, alternate approaches, design concepts, operational procedures, functional requirements, design influences, and approach selection are presented. The following areas are considered: (1) crew transfer, (2) cargo transfer, (3) propellant transfer, (4) attached element operations, and (5) attached element transport. Author

N72-32800*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATION STUDY. VOLUME 3: BASIC VEHICLE SUMMARIES Final Report
N. R. Anderson, A. Gianformaggio et al May 1972 238 p
(Contract NAS9-12068)
(NASA-CR-115725; MSC-04482-Vol-3; SD-72-SA-0007-Vol-3) Avail: NTIS HC $14.00 CSCL 22A

The vehicle related data developed during the orbital operations study are described. The interfacing activity findings

have been realigned into the four basic vehicle systems as follows: (1) earth orbital shuttle (EOS), (2) research and applications module (RAM), (3) space based, ground based, manned and unmanned tugs, and (4) modular space station (MSS). Author

N72-32801*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. APPENDIX A: INTERACTIVITY ANALYSIS Final Report
May 1972 248 p
(Contract NAS9-12068)
(NASA-CR-115727; SD-72-SA-0007; MSC-04482-App-A) Avail: NTIS HC $14.50 CSCL 22A

Supplemental analyses conducted to verify that safe, feasible, design concepts exist for accomplishing the attendant interface activities of the orbital operations mission are presented. The data are primarily concerned with functions and concepts common to more than one of the interfacing activities or elements. Specific consideration is given to state vector update, payload deployment, communications links, jet plume impingement, attached element operations, docking and structural interface assessment, and propellant transfer. Author

N72-32802*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. APPENDIX B: OPERATIONAL PROCEDURES Final Report
D. M. Galvin, H. L. Mattson, D. M. True, N. R. Anderson, E. Mehrbach, A. Gianformaggio, W. L. Steinwachs, and S. H. Turkel
May 1972 404 p
(Contract NAS9-12068)
(NASA-CR-128202; SD-72-SA-0007-App-B; MSC-04482-App-B) Avail: NTIS HC $22.25 CSCL 22A

Operational procedures for each alternate approach for each interfacing activity of the orbital operations study are presented. The applicability of the procedures to interfacing element pairs is identified. Author

N72-32803*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. APPENDIX C: DATA SOURCES AND VEHICLE DESCRIPTIONS Final Report
W. L. Steinwachs May 1972 86 p
(Contract NAS9-12068)
(NASA-CR-128201; MSC-04482-App-C; SD-72-SA-0007-App-C) Avail: NTIS HC $6.50 CSCL 22A

A bibliography of published documents referred to throughout the orbital operations study is presented. A brief description of all of the space program elements included in the study vehicle inventory is developed. Author

N72-32804*# North American Rockwell Corp., Downey, Calif. Space Div.
ORBITAL OPERATIONS STUDY. EXECUTIVE SUMMARY Final Report
L. R. Hogan May 1972 82 p
(Contract NAS9-12068)
(NASA-CR-115726; MSC-04483; SD-72-SA-0008) Avail: NTIS HC $6.25 CSCL 22A

A summary of the analyses of the orbital operations study is presented. Objectives, scope of study, and technical documentation format are discussed. A summary of the mission analyses including generic mission models, element pair interactions, and interfacing activities are presented. The analyses associated with each interfacing activity are also summarized. Significant implications derived during the course of the study on the EOS orbiter, space tug, RAM, and MSS are indicated. Author

N72-32805*# Pennsylvania State Univ., University Park. Materials Research Lab.
QUANTITATIVE MICRO-LUMINESCENCE AND RELATED STUDIES OF FINE AND/OR GLASSY LUNAR SURFACE MATERIALS Interim Technical Report, 1 Mar. 1971 - 29 Feb. 1972
Rustum Roy 30 Jun. 1972 30 p refs
(Grant NGR-39-009-183)
(NASA-CR-128534) Avail: NTIS HC $3.50 CSCL 03B

Papers on Raman and soft X-ray spectroscopy of lunar glasses and electron microscopy of lunar fines are presented. Individual particles of glasses from Apollo 11, 12, 14, and 15 samples were analyzed separately. Silicon emission shifts vary between parent rock types and can be interpreted as a range of Si-O distances from 1.612 to 1.637 A. Aluminum emission shifts relate to the amount of 4- and 6-coordinated Al in the glass. Raman spectra show broadened bands. Certain bands recur in many specimens and relate to the main normative minerals for the glass bulk composition, olivine, pyroxene, and anorthite. Quantitative size and shape analyses were carried out on six Apollo 14 and 15 samples of fines by computer evaluation of scanning electron microspace images. For the size range of 0.50 to 30 micron diameter, the distributions are log-normal on a number count basis. Aspect ratios range from 0.1 to 1.0 with an average value of about 0.6. The aspect ratios and a shape complexity factor vary only slightly among the samples. Author

N72-32806*# California Inst. of Tech., Pasadena. Seismological Lab.
THE COMPOSITION AND ORIGIN OF THE MOON
Don L. Anderson [1972] 58 p refs
(Grant NGL-05-002-069)
(NASA-CR-128194) Avail: NTIS HC $5.00 CSCL 03B

A model is presented of the moon as a high temperature condensate from the solar nebula. The Ca, Al, and Ti rich compounds condense first in a cooling nebula. The initial high temperature mineralogy is gehlenite, spinel, perovskite, Ca-Al-rich pyroxenes, and anorthite. Type 3 carbonaceous chondrites such as the Allende meteorite are composed primarily of these minerals and are highly enriched in refractories. These inclusions can yield basalt and anorthosite in the proportions required to eliminate the europium anomaly, leaving a residual spinel-melilite interior. The inferred high U content of the lunar interior, both from the Allende analogy and the high heat flow, indicates a high temperature interior. The model is consistent with extensive early, shallow melting at 3 A.E., and with high deep internal temperatures. It is predicted that the outer 250 km is rich in plagioclase and FeO. The low iron content of the interior raises the interior temperatures estimated from electrical conductivity by some 800 C. Author

N72-32807*# Texas Univ., Austin. Applied Mechanics Research Lab.
NONLINEAR ESTIMATION THEORY APPLIED TO ORBIT DETERMINATION
Chul Young Choe May 1972 202 p refs
(Grants NGL-44-012-008; AF-AFOSR-2233-72)
(NASA-CR-127326; AMRL-1038) Avail: NTIS HC $12.25 CSCL 03A

The development of an approximate nonlinear filter using the Martingale theory and appropriate smoothing properties is considered. Both the first order and the second order moments were estimated. The filter developed can be classified as a modified Gaussian second order filter. Its performance was evaluated in a simulated study of the problem of estimating the state of an interplanetary space vehicle during both a simulated Jupiter flyby and a simulated Jupiter orbiter mission. In addition to the modified Gaussian second order filter, the modified truncated second order filter was also evaluated in the simulated study. Results obtained with each of these filters were compared with numerical results obtained with the extended Kalman filter and the performance of each filter is determined by comparison with the actual estimation errors. The simulations were designed to determine the effects of the second order terms in the dynamic state relations, the observation state relations, and the Kalman gain compensation term. It is shown that the Kalman

gain-compensated filter which includes only the Kalman gain compensation term is superior to all of the other filters. Author

N72-32808*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
MISSION REQUIREMENTS: SECOND SKYLAB MISSION SL-3, VOLUME 2
1 Feb. 1972 242 p refs
(NASA-TM-X-68613; MSC-1-MRD-001E-Vol-2) Avail: NTIS HC $14.25 CSCL 22A

Revision 6 of the mission requirements is presented. The mission objectives, and requirements are outlined, and detailed test objectives are presented for the medical experiments, ATM, EREP, and corollary experiments. The significant items of the revision are identified. N.E.N.

N72-32809*# Translation Consultants, Ltd., Arlington, Va.
THE AMOUNT OF COSMIC MATERIAL FALLING UPON THE EARTH
J. Pokrzywnicki Washington NASA Sep. 1972 11 p refs Transl. into ENGLISH from Acta Geophys. Pol. (Poland), v. 19, no. 4, 1971 p 439-444
(Contract NASw-2038)
(NASA-TT-F-14507) Avail: NTIS HC $3.00 CSCL 03B

The term cosmic dust is defined, and the finding of cosmic dust on earth and in the solar system is discussed. The basis for calculating the quantity of cosmic dust falling on earth used by various investigators is presented. Author

N72-32810*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARLY MISSIONS TO COMETS
Robert W. Farquhar and Norman F. Ness Aug. 1972 24 p refs Submitted for publication
(NASA-TM-X-66026; X-690-72-347) Avail: NTIS HC $3.25 CSCL 22A

Two specific early missions to the comets Grigg-Skjellerup in 1977 and Encke in 1980 are proposed as precusor missions to Encke rendezvous and Halley intercept in 1986. The mission guidelines and principal objectives are presented. The spacecraft IMP was chosen for the flythrough mission for Grigg-Skjellerup in 1977, and the Helios spacecraft for the Encke mission in 1980. The mission trajectories are summarized in graphs. F.O.S.

N72-32811*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE INTRINSIC VALUES AND COLOR EXCESSES OF (B-V) FOR 115 F-K SUPERGIANTS
Thomas Kelsall Sep. 1972 27 p refs Submitted for publication
(NASA-TM-X-66025; X-641-72-339) Avail: NTIS HC $3.50 CSCL 03A

Color excesses in B-V are determined indirectly from a study of Stromgren's b-y color for a sample of F0 - K5 supergiants. The resulting E(B-V)'s are estimated to have an expected precision of + or - 0.05. With the calculated color excesses and the observed values of B-V given in various catalogs, the run of B-V with spectral type is obtained. This B-V/(spectral type) relationship is compared with those found previously by other investigators. Author

N72-32812*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TROPOSPHERIC RANGE-RATE TRACKING DATA CORRECTION
John W. Marini Aug. 1972 21 p refs Submitted for publication
(NASA-TM-X-66017; X-551-72-277) Avail: NTIS HC $3.25 CSCL 22C

A formula for correcting the tropospheric error in range-rate satellite tracking data is given. The formula is based on the method which was used to obtain corrections for elevation-angle and range data. In addition, an improved method is given for calculating some of the parameters required in the correction formulas. Author

N72-32813*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
OGO-6 DATA ANALYSIS Final Report, 29 Apr. 1966 - 30 Jun. 1972
D. R. Taeusch Aug. 1972 15 p refs
(Contract NAS5-9328)
(NASA-CR-130058; Rept-080410-1-F) Avail: NTIS HC $3.00 CSCL 22C

A general summary is presented of the results of the data reduction effort for the OGO-6 neutral atmosphere composition experiment. Author

N72-32814# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 266
31 Aug. 1972 67 p refs Transl. into ENGLISH from Russian reports
(JPRS-56928) Avail: NTIS HC $5.50

The initiation, present activities, and future plans of the Polish space program are reviewed. International cooperation is also described, particularly the Intercosmos satellite experiments and COSPAR symposium. Of greatest interest is exploring the structure and dynamics of the ionosphere and the rest of the upper atmosphere. Other areas of satellite observations include communication, meteorology, geodesy, biology and medicine, and military defense. Other articles are included on measles vaccine, psychodysleptic agent trihexypheidydil, biocybernetics, and lists of Polish Academy of Science members and activities. N.E.N.

N72-32815# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 283
5 Sep. 1972 70 p refs Transl. into ENGLISH from various Sino-Soviet bloc publications
(JPRS-56944) Avail: NTIS HC $5.50

Translations and abstracts of articles are presented on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included. Author

N72-32816# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 284
14 Sep. 1972 34 p refs Transl. into ENGLISH from various Sino-Soviet bloc publications
(JPRS-57019) Avail: NTIS HC $3.75

Translations and abstracts of articles are presented on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included. Author

N72-32817*# National Aeronautics and Space Administration, Washington, D.C.
THE MARTIAN CREST
I. K. Koval Sep. 1972 16 p Transl. into ENGLISH from Priroda (Moscow), no. 4, 1972 p 2-9
(NASA-TT-F-13919) Avail: NTIS HC $3.00 CSCL 03B

Russian investigations of the surface of the planet Mars are described. During the period from January 22 to February 18, 1972, measurements were continued onboard the Mars 2 and Mars 3 spacecraft of the temperature of Mar's surface and subsurface layers, its geographical relief was investigated, and the characteristics of the atmosphere and space environment

near the planet were determined. Data are presented concerning the dust storm of 1972, the temperature distribution below the planet surface, the boundaries of the ionosphere, and the altitude dependence of atomic hydrogen and oxygen over the planet's surface. Author

N72-32818*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
ATLAS/CENTAUR-29 INTELSAT 4 (F5), OPERATIONS SUMMARY
7 Jun. 1972 39 p
(NASA-TM-X-68626; KSC-TR-1178) Avail: NTIS HC $4.00 CSCL 22C

Mission, launch operations, communications, and test operation are discussed for the Intelsat 4 satellite. These include mission objective and plan, launch vehicle and spacecraft descriptions, postlaunch operations, data acquisition, meteorological plan, and F-1 and F-0 day operations. K.P.D.

N72-32819*# National Aeronautics and Space Administration, Washington, D.C.
VARIATION OF A METEOR SPECTRUM DURING THE TIME OF FLIGHT
V. A. Smirnov and Ya. A. Smirnova Mar. 1972 19 p refs Transl. into ENGLISH from Astron. Vestn. (USSR), v. 3, no. 4, Oct. - Dec. 1969 p 230-235
(NASA-TT-F-14490) Avail: NTIS HC $3.00 CSCL 03A

The character of the dependence of a meteor's color on its brightness is determined on the basis of a spectrophotometric investigation of 40 meteor spectrograms. The mode of the change of a meteor spectrum along its trajectory in the atmosphere is compared with experimental data on collisions between nitrogen atoms and meteoric gases. Author

N72-32820*# Kanner (Leo) Associates, Redwood City, Calif.
ON THE ORIGIN OF LUNAR CRATERS
P. F. Sabaneyev Washington NASA Jun. 1972 28 p refs Transl. into ENGLISH from Vses. Astron.-Geod. Obshch. (USSR), v. 13, no. 20, 1953
(NASA-TT-F-14474) Avail: NTIS HC $3.50 CSCL 03B

The formation of craters and mountains on the lunar surface was studied using cement and tooth powder to simulate lunar soils. The effects of compactness, shape of the falling material, angle of incidence, thickness of the ground layer, and the velocity of the falling material on the crater and embankment formation are discussed. It was found that the solid stream of falling particles packs and moves the layer of cement forming a depression, and part of the falling material forms a packed central hill. It is concluded that the craters arose as a result of falls by compact, uniform round masses of loose materials; and the round shape of the craters indicates a vertical fall of materials. F.O.S.

N72-32821*# Kanner (Leo) Associates, Redwood City, Calif.
DECAMETER WAVELENGTH RADIO EMISSION OF JUPITER AS AN INDICATION OF HIGH VELOCITY FLUXES AND SHOCKWAVES IN THE SOLAR WIND
V. A. Kovalenko and V. N. Malyshkin Washington NASA Jun. 1972 8 p refs Transl. into ENGLISH from Geomagn. Aeron. (USSR), v. 11, no. 5, 1971 p 888-890 Sponsored by NASA
(NASA-TT-F-14470) Avail: NTIS HC $3.00 CSCL 03B

The possibility of determining the average velocities of the geoeffective fluxes and shock waves in the solar wind of Jupiter during minimum solar activity was investigated. Data were taken from decameter wavelength radio emission. E.H.W.

N72-32822*# Kanner (Leo) Associates, Redwood City, Calif.
DETERMINATION OF THE VISUAL AND TRUE COLORS OF NOCTILUCENT CLOUDS
V. V. Sharonov Washington NASA Jun. 1972 3 p Transl. into ENGLISH from Astron. Tsirk. (USSR), no. 212, 1960 p 21-22 Sponsored by NASA
(NASA-TT-F-14460) Avail: NTIS HC $3.00 CSCL 03A

The visible color and true color of three bright sections of noctilucent clouds, along with the cloudless sky background adjacent to it was measured using a Rosenberg astrophotometer. Results show that the diffused color of the cloud is close to both the color of a clear daytime sky (blue) and that of diffuse color according to Rayleigh's law. Detailed results are given in a graph. E.H.W.

N72-32823*# Kanner (Leo) Associates, Redwood City, Calif.
FRAGMENTATION OF METEOR BODIES IN FLARES
V. I. Musiy and I. S. Shestaka Washington NASA Mar. 1972 11 p refs Transl. into ENGLISH from Komety Meteory (USSR), no. 16, 1968 p 20-26 Sponsored by NASA
(NASA-TT-F-14456) Avail: NTIS HC $3.00 CSCL 03B

An evaluation was made of the mass of individual fragments, the fragmentation time, and certain parameters required for plotting theoretical curves of meteor flare brightness. The brightness curves obtained for meteors fragmenting at a constant rate over a certain range of altitudes (from the commencement to the maximum brightness of a flare) are compared with meteor photographs obtained at the Odessa Observatory. Author

N72-32824*# National Aeronautics and Space Administration, Washington, D.C.
THE CAUSE OF METEOR FLARES
D. L. Astravin-Razumin Jun. 1972 6 p refs Transl. into ENGLISH from Komety Meteory (USSR), no. 16, 1967 p 27-29
(NASA-TT-F-14475) Avail: NTIS HC $3.00 CSCL 03A

Meteor motions are calculated at cosmic velocities in a real atmosphere, with allowance for the wind system and turbulent motion of air masses at heights between 70 and 110 km. It is shown that sudden increases in meteor brightness can be attributed to the passage of a meteor body through atmospheric layers of different density. This approach makes it possible to explain not only meteor flares but also the fragmentation of meteors. Author

N72-32825*# National Aeronautics and Space Administration, Washington, D.C.
COLLECTION AND EXAMINATION OF METEOR DUST
I. A. Yudin Jun. 1972 5 p refs Transl. into ENGLISH from Meteorika (Moscow), no. 25, 1964 p 192-193
(NASA-TT-F-14472) Avail: NTIS HC $3.00 CSCL 03B

The structure and mineral composition of meteor dust are considered. Both stony and iron meteorite structure and composition are discussed. It is concluded that the study of meteor dust is possible using data from mineralographic and microchemical investigations of the outer zone of meteorites, as well as from mineralographic studies of fuels and metallic ashes. K.P.D.

N72-32826*# Agnew Tech-Tran, Woodland Hills, Calif.
ON THE POSSIBLE EXPLANATION OF PERIOD BREAKDOWNS OF PULSARS BY THEIR GRAVITATIONAL RADIATION
V. F. Schwartzman Washington NASA Mar. 1972 7 p refs Transl. into ENGLISH from Astron. Tsirkuliar Akad. Nauk SSSR (Kazan), no. 563, 12 May 1970 Prepared for JPL
(Contract NAS7-100)
(NASA-TT-F-14485) Avail: NTIS HC $3.00 CSCL 03A

The breakdown of pulsars, based on the possibility of the pulsars emitting gravitational waves, is discussed. In addition, the occurrence of starquakes with changes in the quadrupole moment of the star is proposed as a possible cause. Mathematical models are presented to support the theoretical considerations. Author

N72-32827*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROJECT CYCLOPS: A DESIGN STUDY OF A SYSTEM

FOR DETECTING EXTRATERRESTRIAL INTELLIGENT LIFE
Bernard M. Oliver 1971 252 p refs
(NASA-TM-X-68634) Avail: NTIS HC $14.75 CSCL 03B

The requirements in hardware, manpower, time, and funding to mount a realistic effort aimed at detecting the existence of extraterrestrial intelligent life are examined. The methods used are limited to present or near term future state-of-the-art techniques. Subjects discussed include: (1) possible methods of contact, (2) communication by electromagnetic waves, (3) antenna array and system facilities, (4) antenna elements, (5) signal processing, (6) search strategy, and (7) radio and radar astronomy. Author

N72-32828*# National Aeronautics and Space Administration, Washington, D.C.
NUMERICAL EXPERIENCES CONCERNING THE CALCULATION OF PERTURBATION IN CELESTIAL MECHANICS WITH THE METHOD OF SPINOR REGULARIZATION
Max Roessler Jun. 1972 17 p Transl. into ENGLISH from Z. Angew. Math. Phys. (Switzerland), v. 16, no. 3, 1965 p 395-401
(NASA-TT-F-14445) Avail: NTIS HC $3.00 CSCL 03A

The plane motion of a vehicle under the gravitational influence of a single central body can be regularized by replacing the Cartesian coordinates x sub 1, x sub 2 of the plane motion at the zero point. The central body is situated by parameters u sub 1, u sub 2, and time by a transformed time equation. The spinor regularization is due to the difference of the dimensions of the x sub i and the u sub i space, with u sub i values satisfying a secondary condition. J.A.M.

N72-32829*# National Aeronautics and Space Administration, Washington, D.C.
OBSERVATION OF THE DIMINUTION OF STAR BRIGHTNESS SEEN THROUGH THE CENTRAL REGION OF BURNHAM'S COMET (1959 k)
F. Dossin Jun. 1972 2 p Transl. into ENGLISH from J. Observateurs (Liege), v. 25, 1962 p 31-32
(NASA-TT-F-14453) Avail: NTIS HC $3.00 CSCL 03A

The Coude focus 1.93 m telescope of the Haut-Provence Observatory was used to observe that the brightness of stars is weakened discernably when one observes these stars through the comet, quite close to the nucleus. Author

N72-32830*# National Aeronautics and Space Administration, Washington, D.C.
RUBIDIUM-STRONTIUM MEASUREMENTS ON BOSUMTWI CRATER GLASSES AND IVORY COAST TEKTITES
H. J. Lippolt and Gerald J. Wasserburg Jun. 1972 17 p refs Transl. into ENGLISH from Z. Naturforsch. (Tuebingen), v. 21A, no. 3, 1966 p 226-231
(NASA-TT-F-14437) Avail: NTIS HC $3.00 CSCL 03B

A Rb-Sr isotopic study of five glasses from the Bosumtwi crater in Ghana and of three Ivory Coast tektites was made. The Sr-87/Sr-86 ratios for the glasses lie between 0.716 and 0.734 and those for the tektites between 0.721 and 0.726. The ratios of Rb/Sr are between 0.196 and 0.328 for crater glasses and between 0.197 and 0.287 for the tektites. The Ivory Coast tektites lie in a region of the Sr evolution diagram which is distinctly lower than for the other tektite groups. The Bosumtwi glasses define an approximately linear array on the Sr evolution diagram which contains the Ivory Coast tektite points. These results show that the Ivory Coast tektites are distinctive from other tektite occurences and suggest that the glasses and the tektites may represent fusion products of similar material.
Author

N72-32831*# Reilly Translations, Gardena, Calif.
A MODEL OF THE RADIO EMISSION OF URANUS
A. D. Kuzmin Washington NASA Mar. 1972 5 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 196, no. 1, 1 Jan. 1971 p 65-66 Sponsored by NASA
(NASA-TT-F-14454) Avail: NTIS HC $3.00 CSCL 03B

A model for the radioemission of the planet Uranus is presented. One characteristic property of the radioemission of the planet is the considerable excess of the measured brightness temperatures above the calculated equilibrium of the planet caused by solar heating. The radioemission model corresponds to the radioastronomical and optical data of the planet. The initial parameters and hypotheses under which the model was constructed are discussed. Author

N72-32832*# National Aeronautics and Space Administration, Washington, D.C.
GENERAL EXPRESSIONS OF THE DEVELOPMENT IN SERIES OF THE COORDINATES OF A CELESTIAL BODY
D. Cipolletti Jun. 1972 8 p Transl. into ENGLISH from Rev. Sci.-Ind. delle Principali Scoperte ed Invenzioni Fatte nelle Scienze e nelle Ind. (Florence), v. 4, Jul. 1872 p 202-206
(NASA-TT-F-14444) Avail: NTIS HC $3.00 CSCL 03A

A numerical analysis is presented of the determination of the orbital elements of a celestial body. K.P.D.

N72-32833*# Radiation Research Associates, Inc., Fort Worth, Tex.
ANALYSIS OF RADIATION AND METEOROID SATELLITE DATA Final Report
B. J. Farmer Jul. 1972 145 p refs
(Contract NAS9-11903)
(NASA-CR-128535; RRA-T7206) Avail: NTIS HC $9.25 CSCL 03B

The data obtained in earth orbit by the Radiation and Meteoroid Satellite (RMS) were interpreted and reduced to a form which will be usable by future space experimenters. The required tasks are detailed. Computer programs were written which lifted the raw data and associated emphemeris data from the GFE magnetic tapes. The engineering data was then used to evaluate the performance of the spacecraft and the experiments. The radiation data was used to prepare flux, spectral, and dose maps of the South Atlantic magnetic anomaly where possible. The meteoroid data was used to determine a rough estimate of the meteoroid flux and in general evaluate the performance of the thin-film meteoroid sensors. The degree of success of the RMS mission was evaluated in light of the separation anomaly which occurred between RMS and OFO during launch. Author

N72-32834*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MARS GRAVITATIONAL FIELD ESTIMATION ERROR
Harold R. Compton and Edward F. Daniels Washington Oct. 1972 42 p refs
(NASA-TN-D-6949; L-8143) Avail: NTIS HC $3.00 CSCL 03A

The error covariance matrices associated with a weighted least-squares differential correction process have been analyzed for accuracy in determining the gravitational coefficients through degree and order five in the Mars gravitational potential junction. The results are presented in terms of standard deviations for the assumed estimated parameters. The covariance matrices were calculated by assuming Doppler tracking data from a Mars orbiter, a priori statistics for the estimated parameters, and model error uncertainties for tracking-station locations, the Mars ephemeris, the astronomical unit, the Mars gravitational constant (G sub M), and the gravitational coefficients of degrees six and seven. Model errors were treated by using the concept of consider parameters. Author

N72-32835*# National Aeronautics and Space Administration, Washington, D.C.
STELLAR EVOLUTION. 5: THE CARBON-FLASH IN A STAR OF 5 SOLAR MASSES
R. Kippenhahn, H.-C. Thomas, and A. Weigert Jun. 1972 41 p refs Transl. into ENGLISH from Z. Astrophys. (Heidelberg), v. 64, 1966 p 373-394
(NASA-TT-F-14427) Avail: NTIS HC $4.25 CSCL 03B

The onset of carbon burning in a star of five solar masses after exhaustion of its central helium content is computed. Since the ignition of carbon takes place in a degenerate region, the flash phenomenon occurs. The computations are carried out until degeneracy is removed and nuclear burning becomes stable. During this phase the helium burning shell becomes less and less important as the hydrogen is again ignited at the interface between the outer hydrogen-rich envelope and the helium core. Author

N72-32836*# National Aeronautics and Space Administration, Washington, D.C.
THE PHYSICAL LIGHT VARIATION OF THE PLANETS SATURN AND URANUS
W. Becker Jun. 1972 20 p refs Transl. into ENGLISH from Astron. Nachr. (Kiel), v. 277, 1949 p 65-72
(NASA-TT-F-14419) Avail: NTIS HC $3.00 CSCL 03A

The reduction and compilation of all brightness observations for the planets Saturn and Uranus known since 1852 were analyzed. The physical light variation for Saturn was numerically analyzed and the results are presented. In the case of Uranus there is a superposition of the amplitude variation of a period of 82 years with a physical light variation which follows a sinusoidal course and whose period fluctuates between 5.5 and 11.5 years. Especially low minima coincide in the cases of Saturn and Uranus and occur simultaneously with a minimum of sun spots. Author

N72-32837*# Addis Translations International, Woodside, Calif.
DRAG AND HEAT TRANSFER COEFFICIENTS OF METEOR BODIES. 1: CONDITIONS OF WEAK SHIELDING
V. N. Lebedinets, Yu. I. Portnyagin, and A. K. Sosnova Washington NASA May 1972 19 p refs Transl. into ENGLISH from Astron. Vestn. (USSR), v. 3, no. 4, Oct. - Dec. 1969 p 223-229 Sponsored by NASA
(NASA-TT-F-14491) Avail: NTIS HC $3.00 CSCL 03B

A numerical analysis is presented of the drag and heat transfer coefficients of meteor bodies in the atmosphere. Account is taken of the shielding of the meteor surface by the repelled and vaporized molecules. A study is made of the free molecule regime with allowance for the dependence of the effective diffusion cross section on velocity. Critical values of the meteor dimensions are given at which the shielding effect becomes significant. Author

N72-32838*# National Aeronautics and Space Administration, Washington, D.C.
EVOLUTION WITH NEUTRINO LOSSES AND THERMAL PULSES OF THE HELIUM-SHELL SOURCE IN A STAR OF 5 SOLAR MASSES
A. Weigert Jun. 1972 63 p refs Transl. into ENGLISH from Z. Astrophys. (Heidelberg), v. 64, no. 5, 1966 p 395-425
(NASA-TT-F-14452) Avail: NTIS HC $5.25 CSCL 03A

The core contraction after central helium burning was recalculated for a 5 solar mass star. Energy losses due to photoneutrinos and plasma neutrinos were taken into account. A local thermal instability appeared in the helium-burning shell source of the models, and the resulting thermal runaway was analyzed numerically. Six of the thermal pulses of the shell source were calculated. They appear with increasing amplitude at time intervals of about 10,000 years. Author

N72-32839*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE FORMATION OF INTERSTELLAR DIATOMIC MOLECULES
Theodore P. Stecher and David A. Williams Oct. 1972 29 p refs Submitted for publications
(NASA-TM-X-66056; X-672-72-366) Avail: NTIS HC $3.50 CSCL 03B

Reactions between atoms and ions of the interstellar medium and vibrationally excited molecular hydrogen are shown to produce a specific set of molecules. Molecules such as CO and CN can readily be produced in abundances greater than those of corresponding hydrides. When quantified in a simple manner the equilibrium density of molecules compares well with the observed values for the star Oph. Author

N72-32840*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE INTERSTELLAR REDDING LAW IN THE ULTRAVIOLET DEDUCED FROM FILTER PHOTOMETRY OBTAINED BY THE OAO-2 SATELLITE
Michel Laget Aug. 1972 26 p refs Submitted for publication
(NASA-TM-X-66055; X-673-72-362) Avail: NTIS HC $3.50 CSCL 03B

Filter photometry has been obtained of 16 BO stars at ten effective wavelengths in the range 4250-1430 A. The wavelength dependence of the interstellar reddening law, deduced from a least squares fit of the observed values to the reddening line at each band, is found in satisfactory agreement with that derived by Bless and Savage (1972). Toward the shorter wavelengths the increase of the computed probable error of the slope of the mean reddening line suggests that large fluctuations in the law may occur from star to star. Similar computations, separating main-sequence stars and supergiants, indicate that the large fluctuations of the law appear to be well related to the luminosity of the stars; the supergiants show systematically less extinction, this deficiency becoming large toward the far UV. The small number in the sample however, does not allow a general conclusion to be drawn. Author

N72-32841# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AS USSR. ASTRONOMY REPORTS (SELECTED ARTICLES)
S. S. Novikov, A. A. Ovchinnikov, P. W. Shcheglov, and V. V. Rodionov 23 Mar. 1972 24 p refs Transl. into ENGLISH from Astron. Tsirk. (USSR), no. 554, 1970 p 1-8
(AD-744172; FTD-MT-24-1816-71) Avail: NTIS CSCL 04/1

Contents; Methods of astroclimatic measurements; Aeroclimatic studies of the disturbing air layer in the region of the high-altitude expedition of the shternberg state astronomical institute; Study of the astroclimate at the high-altitude expedition of the shternberg state astronomical institute using the double-beam instrument (DLP-1M); A photoelectric double-beam instrument with a variable base. GRA

31 SPACE VEHICLES

Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also: 28 Propulsion Systems; and 32 Structural Mechanics.

N72-32842*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
MODULAR SPACE STATION PROGRAM OPTION
Jan. 1972 52 p refs
(Contract NAS8-15140)
(NASA-CR-123759; MDC-G2717) Avail: NTIS HC $4.75 CSCL 22B

The study to determine whether a viable space station experiment program of 5 to 10 years duration could be defined that would reduce the projected program cost of $6 billion is presented. The options considered are limited to a six-man capability. The identification and description of the options, impact assessment of these options on the space station design, and the costs and schedules for encompassing each option are summarized. It is concluded that viable space station programs of 5 to 10 years duration are attainable; however, the 10-year program offers a significantly greater return on the investment. F.O.S.

N72-32843*# Planning Research Corp., Huntsville, Ala. Systems Services Co.

A METHOD OF HARDWARE QUALIFICATION FOR FLIGHT BY ANALYSES, SIMILARITY AND INTEGRATED TESTING

John B. Andriulli and Robert N. Luther 10 Apr. 1972 95 p refs

(Contract NAS8-21811)

(NASA-CR-123831; PRC-D-2085) Avail: NTIS HC $6.75 CSCL 22B

The results are described of a study on four pieces of flight hardware from the Saturn 1U and S-4B stages to determine whether the objectives of the formal qualification tests on that hardware could have been obtained within that program by methods other than performing the qualification tests. These methods include qualification by analyses, similarity and integrated testing, i.e., distribution of the objectives among the other tests in the program. It was found that it is feasible to delete the requirements for formal qualification testing provided that it is accomplished early in the program to allow adequate planning for accomplishing the qualification objectives by other means. Additionally, a scorekeeping system was defined that is simple, straightforward, easy to implement. This scorekeeping system provides complete visibility of equivalent qualification status at any point during the program. A set of groundrules for implementing this study was established as a result of findings on the specific items of hardware studied. Author

N72-32844*# General Dynamics/Convair, San Diego, Calif. Aerospace Div.

SPACE LOX VENT SYSTEM Design Phase Report

J. A. Stark 10 Aug. 1972 25 p refs

(Contract NAS8-26972)

(NASA-CR-123826; GDC-632-3-134) Avail: NTIS HC $3.25 CSCL 22B

The research of the program to design and build a prototype vent system capable of exhausting only vapor to space from an all liquid or two-phase mixture of oxygen, while operating under low or zero-gravity conditions is reported. Work performed during the detail design phase of the program was concerned with the finalization of vent system performance, development of component specifications, solicitation of vendor bids, selection of components and overall system package design. The compact system preliminary design defined for the comparisons was reviewed in light of a desirability to demonstrate complete tank mixing at one-g. Also, performance of the system at low-g conditions with a full tank and maximum temperature stratification or maximum pressure rise between vent cycles was investigated. It was found that under these extreme conditions, not previously considered, that use of a larger pump mixer than previously defined would be desirable. In addition, to simplify ground testing with only a small weight penalty, the exchanger vent pressure was increased from 5 psia to 22 psia nominal. This resulted in less than a 0.2% increase in system weight. Author

N72-32845*# General Dynamics/Convair, San Diego, Calif.

INVESTIGATION OF STRUCTURAL FACTORS OF SAFETY FOR THE SPACE SHUTTLE Final Report

26 Jun. 1972 316 p refs

(Contract NAS8-27048)

(NASA-CR-123837; GDCA-DFM72-005) Avail: NTIS HC $18.00 CSCL 22B

A study was made of the factors governing the structural design of the fully reusable space shuttle booster to establish a rational approach to select optimum structural factors of safety. The study included trade studies of structural factors of safety versus booster service life, weight, cost, and reliability. Similar trade studies can be made on other vehicles using the procedures developed. The major structural components of a selected baseline booster were studied in depth, each being examined to determine the fatigue life, safe-life, and fail-safe capabilities of the baseline design. Each component was further examined to determine its reliability and safety requirements, and the change of structural weight with factors of safety. The apparent factors of safety resulting from fatigue, safe-life, proof test, and fail-safe requirements were identified. The feasibility of reduced factors of safety for design loads such as engine thrust, which are well defined, was examined. Author

N72-32846*# Alabama Univ. Research Inst., Huntsville. Div. of Graduate Programs.

EVALUATION OF HUMAN ENGINEERING DESIGN STANDARD (MSFC-STD-267A) IN THE DESIGN OF MANNED SPACE VEHICLES Final Report

Jon G. Rogers May 1972 286 p refs

(Grant NGL-01-008-001)

(NASA-CR-61393) Avail: NTIS HC $16.50 CSCL 22B

The major conclusion of the detailed examination of the human factors engineering design standard is that it is unsuitable for future spacecraft design. The standard, published in 1966, was not intended to be a zero or reduced gravity standard and was directed primarily toward ground support equipment and technology. Futhermore, ambiguities, conflicts, and unenforceable requirements contribute to the difficulty. The role of man in future space missions and its impact on human engineering standards are also discussed, and it is concluded that greater standardization is vital to the success of future missions. A survey of NASA/MSFC contractors was made, and it was found that MSFC-STD-267A is largely ignored and the most significant problems are inaccessibility and nonspecificity of the data. The resistance of contract management and designer and of program managers is a primary reason for poor human engineering design. Specific recommendations for improvement of format and organization, including an interim solution, are given. N.E.N.

N72-32847*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.

REFURBISHMENT COST STUDY OF THE THERMAL PROTECTION SYSTEM OF A SPACE SHUTTLE VEHICLE, PHASE 2

D. W. Haas 23 Aug. 1972 24 p

(Contract NAS1-10990)

(NASA-CR-112123) Avail: NTIS HC $3.25 CSCL 22B

Labor costs and techniques associated with the refurbishment of representative TPS and their attach concepts suitable for space shuttle application were identified on the basis of experimental tests. Ablative and reusable surface insulation TPS configurations were designed, fabricated, and tested on a full-scale mockup. The TPS attachment methods included pi-strap, multiple mechanical fasteners, key/keyway, and direct bond concepts. Techniques for installation, inspection, repair and replacement of TPS components were studied by examining a variety of shop procedures. Major problem areas associated with these procedures and the designs to which they were applied were analyzed for several significant parameters such as handling, gaskets between joints, repair techniques, ablator plugs, etc. Results of time and motion studies of specific maintenance tasks, simulating operational procedures, were obtained. Using these data, refurbishment labor cost projections were generated for a representative orbiter. Results show that refurbishment labor costs and maintenance techniques are sensitive to heat shield material type and attachment method. Author

N72-32848*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

APOLLO EXPERIENCE REPORT: LUNAR MODULE ELECTRICAL POWER SUBSYSTEM

Arturo B. Campos Washington Sep. 1972 17 p ref

(NASA-TN-D-6977; MSC-S-337) Avail: NTIS HC $3.00 CSCL 10A

The design and development of the electrical power subsystem for the lunar module are discussed. The initial requirements, the concepts used to design the subsystem, and the testing program are explained. Specific problems and the modifications or compromises (or both) imposed for resolution are detailed. The flight performance of the subsystem is described, and recommendations pertaining to power specifications for future space applications are made. Author

N72-32849*# Fairchild Industries, Inc., Germantown, Md.
INTEGRATED DYNAMIC ANALYSIS SIMULATION OF SPACE STATIONS WITH CONTROLLABLE SOLAR ARRAYS (SUPPLEMENTAL DATA AND ANALYSES) Final Report
Joseph A. Heinrichs and Joseph J. Fee (Wolf Res. and Develop. Corp.) Sep. 1972 464 p refs
(Contract NAS1-10155)
(NASA-CR-112145) Avail: NTIS HC $25.25 CSCL 22B

Space station and solar array data and the analyses which were performed in support of the integrated dynamic analysis study. The analysis methods and the formulated digital simulation were developed. Control systems for space station altitude control and solar array orientation control include generic type control systems. These systems have been digitally coded and included in the simulation. Author

N72-32850*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMETARY EXPLORER TO GRIGG-SKJELLERUP 1977
N. F. Ness, L. F. Burlaga, R. W. Farquhar, B. D. Donn, W. M. Jackson, and D. K. McCarthy Sep. 1972 63 p refs
(NASA-TM-X-66023; X-690-72-337) Avail: NTIS HC $5.25 CSCL 22B

The mission analysis and technical summary of the spacecraft and its subsystems are presented for an Explorer flight to investigate the solar wind interaction with the Grigg-Skjellerup coma. The basic spacecraft system is the same as Explorer 43 and 47, and the mission characteristics which distinguish this mission from previous IMP missions are discussed. The physical and chemical characteristics of the comet's nucleus and coma are described, and the spacecraft trajectory and scientific payloads required to study the solar wind-cometary atmospheric interaction are considered. N.E.N.

N72-32851*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PRELIMINARY STUDY OF THE APPLICATION OF THE TIMATION 3 SATELLITE TO EARTH PHYSICS
Lloyd Carpenter, ed. Mar. 1972 25 p ref Submitted for publication
(NASA-TM-X-66012; X-553-72-50) Avail: NTIS HC $3.25 CSCL 22C

The Timation 3 is a timing and navigation satellite originally planned for launch in December 1972 into a circular orbit at 98 deg inclination 14,000 km altitude with gravity gradient stabilization. An error analysis indicates a satellite position uncertainty of about one meter, 80 percent of which is attributable to the assumed gravity model errors. The remaining uncertainties have a period equal to that of the satellites and can be filtered out yielding an effective uncertainty of about 10 cm in the study of phenomena having different periodicities. The accomplishment of these results depends on a careful consideration of solar radiation pressure taking account of the spacecraft reflecting properties and variations in the presentation area. Consideration is also given to the displacment of the laser reflectors from the center of mass of the spacecraft and to the dynamic coupling of any libration in attitude with the orbital motion. The results indicate that a good set of well distribution laser observations of Timation 3 could yield determinations of polar motion, sea floor spreading, solid earth tides, and earth rotation at the 10 cm level. Author

N72-32852*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: PHOTOGRAPHIC EQUIPMENT AND OPERATIONS DURING MANNED SPACE-FLIGHT PROGRAMS
Helmut A. Kuehnel Washington Sep. 1972 67 p refs
(NASA-TN-D-6972; MSC-309) Avail: NTIS HC $3.00 CSCL 22C

The evolution of crew-operated photographic equipment and the procedures for manned space-flight photographic operations are reviewed. The establishment of program requirements is described. Photographic operations are discussed, including preflight testing and inflight operations. Author

N72-32853*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FLOW FIELD MEASUREMENTS AROUND A MARS LANDER MODEL USING HOT FILM ANEMOMETERS UNDER SIMULATED MARS SURFACE CONDITIONS
George C. Greene, Lloyd S. Keafer, Jr., Charles G. Marple, and Jerome T. Foughner, Jr. Washington Sep. 1972 132 p refs
(NASA-TN-D-6820; L-8134) Avail: NTIS HC $3.00 CSCL 20D

Results are presented from a wind-tunnel investigation of the flow field around a 0.45-scale model of a Mars lander. The tests were conducted in air at values of Reynolds number equivalent to those anticipated on Mars. The effects of Reynolds number equivalent to those anticipated on Mars. The effects of Reynolds number, model orientation with respect to the airstream, and the position of a dish-type antenna on the flow field were determined. An appendix is included which describes the calibration and operational characteristics of hot-film anemometers under simulated Mars surface conditions. Author

N72-32854*# National Aeronautics and Space Administration, Washington, D.C.
THE FOURTEEN FRENCH SATELLITES
Aug. 1972 8 p Transl. into ENGLISH from Air Cosmos (France), no. 390, 29 May 1971 p 101
(NASA-TT-F-14604) Avail: NTIS HC $3.00 CSCL 22B

Profiles of the 14 French satellites are tabulated. The launch vehicle, weight and effective life, missions and new features, and production supervision are presented for each satellite. F.O.S.

N72-32855*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FLIGHT TEST OF AN ERECTABLE SPACECRAFT USED FOR DECELERATOR TESTING AT SIMULATED MARS ENTRY CONDITIONS
Allen B. Henning and Reginald R. Lundstrom Washington Oct. 1972 58 p refs
(NASA-TN-D-6910; L-8595) Avail: NTIS HC $3.00 CSCL 22C

A 55 foot diameter disk-gap-band parachute was deployed behind an expandable 15 foot diameter, 120 deg blunted-cone simulated spacecraft. The spacecraft was carried to altitude in the folded condition. An automatic control system kept the folded spacecraft pointing in the desired direction after booster separation. The aeroshell was then erected at the desired conditions by ground command. When the desired parachute test conditions were reached, another ground command deployed the test parachute. The test Mach number and dynamic pressure obtained at the parachute peak load were 2.62 and 19.4 pounds per square foot respectively. A large disturbance after aeroshell erection caused a large angle of attack to exist at parachute deployment. Methods of preventing this disturbance are discussed. Author

N72-32856*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CENTAUR SPACE VEHICLE PRESSURIZED PROPELLANT FEED SYSTEM TESTS
Washington Oct. 1972 207 p refs
(NASA-TN-D-6876; E-6408) Avail: NTIS HC $3.00 CSCL 22B

Engine firing tests, using a full-scale flight-weight vehicle, were performed to evaluate a pressurized propellant feed system for the Centaur. The pressurant gases used were helium and hydrogen. The system was designed to replace the boost pumps currently used on Centaur. Two liquid oxygen tank pressurization modes were studied: (1) directly into the ullage and (2) below the propellant surface. Test results showed the two Centaur RL10 engines could be started and run over the range of expected flight variables. No system instabilities were encountered. Measured pressurization gas quantities agreed well with analytically predicted values. Author

N72-32857*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO COMMAND MODULE LAND IMPACT TESTS
J. E. McCullough and J. F. Lands, Jr. Washington Oct. 1972 62 p
(NASA-TN-D-6979; MSC-S-301) Avail: NTIS HC $3.00 CSCL 22B

Full-scale-model and actual spacecraft were impact tested to define the emergency land-landing capability of the Apollo command module. Structural accelerations and strains were recorded on analog instrumentation, and a summary to these dwta is included. The landing kinematics were obtained from high-speed photography. Photographs of the structural damage caused during the tests are included. Even though extensive damage can be expected, the crew will receive nothing more than minor injuries during the majority of the probable landing conditions. Author

N72-32858# Finnish Academy of Technical Sciences, Helsinki.
A PERTURBATION SOLUTION OF THE DECELERATION TRAJECTORY IN BALLISTIC RE-ENTRY
Risto Arho (Tampere Univ. of Technol., Finland) 1971 20 p refs
(PB-208108; APS-Me-65) Avail: NTIS HC $3.00; Acta Polytechnica Scandinavica Publishing Office, Box 5073, Stockholm 5, Sweden Sw. kr. 10.00 CSCL 16B

A perturbation is developed to solve the deceleration trajectory of ballistic reentry in a moving atmosphere. Author (GRA)

N72-32859# Aerospace Corp., San Bernardino, Calif.
THERMAL STRESS ANALYSIS OF REENTRY VEHICLE NOSETIPS AT ANGLE OF ATTACK Technical Report, Sep. 1971 - Jan. 1972
James G. Crose and Thomas K. McKinley 12 Apr. 1972 35 p refs
(Contract F04701-71-C-0172)
(AD-743897; TR-072(S2816-15)-2; SAMSO-TR-72-121) Avail: NTIS CSCL 16/3

The ASAAS (Asymmetric Stress Analysis of Axisymmetric Solids) computer program is applied to the prediction of thermal stresses in a reentry vehicle nosetip subjected to asymmetric temperature distributions and angle-of-attack loadings during reentry. This three-dimensional stress analysis computer program has the unique capability of properly accounting for the circumferential variation of temperature-dependent material properties. It is based on a meridional finite element discretization of an axisymmetric solid combined with a Fourier series representation of circumferentially dependent variables. In contrast with similar methods where material properties cannot be expressed as a function of temperature, this method requires that the large system of equations be solved simultaneously. This is handled efficiently in ASAAS by several newly developed approaches to stiffness matrix generation and simultaneous equation solution. Author (GRA)

32 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

N72-32860 Engineering Sciences Data Unit, London (England).
BUCKLING OF THIN FLAT ORTHOTROPIC PLATES UNDER UNIAXIAL COMPRESSION
Sep. 1971 7 p refs Sponsored by Roy Aeron. Soc.
(ESDU-71015) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The uniaxial compressive buckling load for thin, flat, rectangular, orthotropic plates is given. The edges of the plates are parallel to the axes of elastic symmetry of the material. K.P.D.

N72-32861 Engineering Sciences Data Unit, London (England).
LOCAL BUCKLING OF COMPRESSION PANELS WITH FLANGED STRINGERS
Aug. 1971 14 p refs Supersedes ESDU-Struct-02.01.25 Sponsored by Roy. Aeron. Soc.
(ESDU-71014; ESDU-Struct-02.01.25) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The local buckling coefficient is indicated for panels having integrally manufactured single- or double-flanged stringers. K.P.D.

N72-32862 Engineering Sciences Data Unit, London (England).
THE ESTIMATION OF R.M.S. STRESS IN STIFFENED SKIN PANELS SUBJECTED TO RANDOM ACOUSTIC LOADING
Jan. 1972 16 p refs Amendment B Supersedes ESDU-66021 Sponsored by Roy. Aeron. Soc.
(ESDU-72005; ESDU-66021) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The estimation procedure is described in detail, and examples are given to illustrate the methodology. In addition, graphs are presented which show comparisons between estimated and measured stresses. Author

N72-32863 Engineering Sciences Data Unit, London (England).
BENDING MOMENT AT CENTRE OF A STRUT DUE TO END LOADS AND UNIFORMLY DISTRIBUTED SIDE LOAD
May 1971 3 p
(ESDU-01.01.16) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

A strut is considered as bending in one plane under the combined action of end loads, a uniformly distributed side load, and equal end restraining moments, all acting in the plane of bending. The end restraining moments arise from the stiffness of the structure to which the strut is attached at its ends. The flexural stiffness of the strut is assumed uniform along its length and constant during the process of deflection. K.P.D.

N72-32864 Engineering Sciences Data Unit, London (England).
FLEXURAL PROPERTIES OF FLIPPED Z AND CHANNEL SECTION STRINGERS (c/h EQUALS 0.2)
Jan. 1971 2 p Sponsored by Roy. Aeron. Soc.
(ESDU-01.00.03) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Assuming that the Z or channel stringer is constrained to bend in the plane of the web, and the moment of inertia of the stringer is about the axis through its centroid, parallel to the flanges, curves are derived for determining the flexural properties of struts. F.O.S.

N72-32865 Engineering Sciences Data Unit, London (England).
INITIAL BUCKLING OF FLAT PLATES UNDER COMBINED LONGITUDINAL AND TRANSVERSE DIRECT STRESS (ALL EDGES FIXED AGAINST ROTATION)
Nov. 1970 3 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-02.01.40) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

Assuming that a plate is fixed against rotation at all four edges, graphs for determining the compressive stress of elastic buckling for flat plates in the elastic range are derived. F.O.S.

N72-32866 Engineering Sciences Data Unit, London (England).
FATIGUE STRENGTH OF STEEL SCREW THREADS UNDER AXIAL LOADING (NOT GREATER THAN 1.0 INCH DIAMETER)
Feb. 1969 9 p refs Supersedes ESDU-67013 Sponsored by Roy. Aeron. Soc.
(ESDU-69001; ESDU-67013) Copyright. Avail: On subscription from Engineering Sciences Data Unit, 251-259 Regent Street, London W1R 7AD

The significant results are described of approximately 1400 fatigue tests involving core failures of solid low-alloy steel screw threads. Curves were obtained of the ratio of (the alternating stress/tensile strength) against endurance. The ranges of the experimental variables are given and their influence on fatigue performance is discussed. Author

N72-32867*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NASTRAN: USERS' EXPERIENCES
Washington Sep. 1972 523 p refs Presented at 2d NASTRAN Users' Colloq., Hampton, Va., 11-12 Sep. 1972
(NASA-TM-X-2637; L-8553) Avail: NTIS HC $6.00 CSCL 20K

The application of NASTRAN to a variety of static and dynamic structural problems is considered. For individual titles, see N72-32868 through N72-32902.

N72-32868* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NASTRAN: A PROGRESS REPORT
J. Philip Raney and Deene J. Weidman *In its* NASTRAN: Users' Experiences Sep. 1972 p 1-11 refs (For availability see N72-32867 23-32)
CSCL 20K

Significant NASTRAN-related events since September, 1971 are reviewed. The present operation of the NASTRAN systems management office is described, as well as new capabilities and improvements incorporated in Level 15 of NASTRAN, and priorities for furure levels of NASTRAN. Author

N72-32869* National Aeronautics and Space Administration, Washington, D.C.
NASTRAN: DISSEMINATION EXPERIENCES AND USER BENEFITS c08
Joseph M. Carlson *In its* NASTRAN: Users' Experiences Sep. 1972 p 13-14 (For availability see N72-32867 23-32)
CSCL 09B

A preliminary survey was conducted of the NASTRAN user community. Results are presented. Author

N72-32870* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TECHNICAL AND SOCIAL IMPACT OF NASTRAN c08
Thomas G. Butler *In its* NASTRAN: Users' Experiences Sep. 1972 p 15-27 (For availability see N72-32867 23-32)
CSCL 09B

Estimates are made as to the direction in which a new generation of general purpose applications programs can be expected to migrate. Predictions are made as to the impacts that space technology is liable to have within the field of structural engineering and on the society in which it interacts. Author

N72-32871* Aerojet Solid Propulsion Co., Sacramento, Calif.
BUCKLING ANALYSIS OF A MISSILE INTERSTAGE
David P. Dudley *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 29-38 ref (For availability see N72-32867 23-32)
CSCL 20K

The NASTRAN program was used to find the buckling location and the degradation factor due to a specified temperature field for an interstage of a typical three stage missile. The model was made up of 6332 independent degrees of freedom. This large size required the use of an IBM 370/195 for evaluation of the eigenvalues. The effect of elevated temperature was to lower the critical buckling load by 3%. Author

N72-32872* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASTRAN BUCKLING ANALYSIS OF A THIN WALLED CYLINDER
Ralph B. Wight *In its* NASTRAN: Users' Experiences Sep. 1972 p 39-51 refs (For availability see N72-32867 23-32)
CSCL 20K

The computer run time required for a buckling analysis using NASTRAN is considerably greater than for a linear static analysis of the same structure. It is very important to obtain an optimal model size for the structure being analyzed, such that the model is neither so large as to increase running time unnecessarily, nor so small as to hinder accuracy. The problem of critical load accuracy versus model complexity is considered for a thin walled cylinder, using both Level 12 and Level 15 NASTRAN releases. Author

N72-32873* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
STRESS AND BUCKLING ANALYSIS OF A DOUBLE-BUBBLE TANK STRUCTURE
James C. Robinson and John H. Dutton (McDonnell-Douglas Corp.) *In its* NASTRAN: Users' Experiences Sep. 1972 p 53-71 refs (For availability see N72-32867 23-32)
CSCL 20K

An analytical study of a two-lobed circular arc pressure vessel (double-bubble tank) with a local perturbation from the cylindrical shape was made. It can be concluded that NASTRAN provides a good linear buckling analysis capability for structures that cannot be handled by other analysis techniques. However, solutions are relatively expensive from a computational standpoint. Two worthwhile additions to the NASTRAN program would be the inclusion of a new beam element that adequately represents the shear transfer when modeling stiffeners on a shell and the capability, in a rigid format, to keep certain prescribed loads constant during the eigenvalue extraction process. Author

N72-32874* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SOME APPLICATIONS OF NASTRAN TO THE BUCKLING OF THIN CYLINDRICAL SHELLS WITH CUTOUTS
Jerry G. Williams and James H. Starnes, Jr. *In its* NASTRAN: Users' Experiences Sep. 1972 p 73-97 refs (For availability see N72-32867 23-32)
CSCL 20K

The buckling of isotropic and waffle-stiffened circular cylinders with and without cutouts was studied using NASTRAN's Rigid Format 5 for the case of axial compressive loading. The results obtained for the cylinders without cutouts are compared with available reference solutions. The results for the isotropic cylinders containing a single circular cutout with selected radii are compared with available experimental data. For the waffle-stiffened cyclinder, the effect of two diametrically opposed rectangular cutouts was studied. A DMAP alter sequence was used to permit the necessary application of different prebuckling and buckling boundary conditions. Advantage was taken of available symmetry planes to formulate equivalent NASTRAN model segments which reduced the associated computational cost of performing the analyses. Limitations of the applicability of NASTRAN for the solution of problems with nonlinear characteristics are discussed. Author

N72-32875* Westenhoff and Novick, Inc., Chicago, Ill.
ANALYSIS AND DESIGN OF ON-GRADE REINFORCED CONCRETE TRACK SUPPORT STRUCTURES
Francis G. McLean, Ronald D. Williams, and Lance R. Greening *In* NASA. Langley Res. Center NASTRAN: Users' Experiences

Sep. 1972 p 99-110 refs Sponsored by DOT (For availability see N72-32867 23-32)
CSCL 13M

For the improvement of rail service, the Department of Transportation, Federal Rail Administration, is sponsoring a test track on the Atchison, Topeka, and Santa Fe Railway. The test track will contain nine separate rail support structures, including one conventional section for control and three reinforced concrete structures on grade, one slab and two beam sections. The analysis and design of these latter structures was accomplished by means of the finite element method, NASTRAN, and is presented. Author

N72-32876* General Motors Research Labs., Warren, Mich.
EXPERIENCES IN INTERFACING NASTRAN WITH ANOTHER FINITE ELEMENT PROGRAM
Dennis D. Schwerzler and Robert K. Leverenz *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 111-119 ref (For availability see N72-32867 23-32)
CSCL 20K

The coupling of NASTRAN to another finite element program developed for the static analysis of automotive structures is discussed. The two programs were coupled together to use the substructuring capability of the in-house program and the normal mode analysis capability of NASTRAN. Modifications were made to the NASTRAN program in order to make the coupling feasible. Author

N72-32877* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DELTA LAUNCH VEHICLE ISOGRID STRUCTURE NASTRAN ANALYSIS
Daniel J. Knighton *In its* NASTRAN: Users' Experiences Sep. 1972 p 121-143 refs (For availability see N72-32867 23-32)
CSCL 20K

Structural analysis applications of NASTRAN to the isogrid structure of the Delta launch vehicle are discussed. Isogrid is a method employed to stiffen the booster cylindrical shell surface by integrally machining ribs and skin from one piece of metal. The ribs are arranged in a repetitive equilateral triangular pattern; this results in a structural surface whose stiffness is orthogonally isotopic. For that structure, both static and general instability buckling analyses are described and the theoretical results are compared to test data. One of the parameters included in the analysis is the effect of pressure loadings on the buckling allowable load. In addition, a description of a supplementary computer program is presented. Author

N72-32878* Old Dominion Univ., Norfolk, Va.
A NASTRAN CORRELATION STUDY FOR VIBRATIONS OF A CROSS-STIFFENED SHIP'S DECK
Earl A. Thornton *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 145-159 refs (For availability see N72-32867 23-32)
CSCL 20K

To evaluate the effectiveness of NASTRAN for predicting the vibration modes of panels with bending-membrane coupling, a cross-stiffened ship deck was analyzed. In correlation with experimental data, one NASTRAN finite element representation gave results slightly more accurate than a previous analytical solution. Computational time was excessively long, due to the Guyan method of reducing the eigenvalue problem. It is recommended that a more efficient method of matrix reduction be implemented for the lumped mass formulation. Author

N72-32879* Hanford Engineering Development Lab., Richland, Wash.
TRANSIENT ANALYSIS OF AN IVHM GRAPPLE IMPACT TEST
R. G. Hill *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 161-178 refs (For availability see N72-32867 23-32)
CSCL 20K

A lumped mass model was used to represent the impact condition between a fuel duct and an IVHM in-vessel fuel handling machine. The nonlinear effects of a Bellville spring and the free fall impact of the fuel duct on the IVHM were included. The purpose of the tests was to determine the loads on the fuel duct due to the impact. A comparison between experimental and theoretical results is presented. Author

N72-32880* General Motors Research Labs., Warren, Mich.
MODELING TECHNIQUES OF THIN WALLED BEAMS WITH OPEN CROSS SECTIONS
Knut S. Skattum *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 179-195 refs (For availability see N72-32867 23-32)
CSCL 20K

A composite element is presented which includes the effects of warping and offset shear centers. It is shown to be mathematically consistent with thin walled open beam theory and can be incorporated into any structural analysis program by use of NASTRAN'S standard elements. A numerical example analyzing the vibration of a channel beam is presented, and, by using the composite element, the numerical results agreed well with theoretical data. Author

N72-32881* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COMPLEX EIGENVALUE ANALYSIS OF ROTATING STRUCTURES
Jayant S. Patel (Teledyne Brown Eng. Co.) and S. M. Seltzer *In its* NASTRAN: Users' Experiences Sep. 1972 p 197-234 refs (For availability see N72-32867 23-32)
CSCL 20K

A FORTRAN subroutine to NASTRAN which constructs coriolis and centripetal acceleration matrices, and a centrifugal load vector due to spin about a selected point or about the mass center of the structure is discussed. The rigid translational degrees of freedom can be removed by using a transformation matrix T and its explicitly given inverse. These matrices are generated in the subroutine and their explicit expressions are given. Author

N72-32882*+ General Dynamics/Fort Worth, Tex.
LEVEL 12 NASTRAN EXPERIENCES AT GENERAL DYNAMICS, CONVAIR AEROSPACE DIVISION, FORT WORTH OPERATIONS
Merle Allen *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 235-261 refs (For availability see N72-32867 23-32)
Avail: NTIS CSCL 20K

The level 12 NASTRAN was used to support the NASA/LaRC advanced transport technology study, a predesign, short response time effort. Aeroelastic analyses were performed. NASTRAN calculated the vibration modes for the supported airfoil components and the entire unsupported vehicle. Other procedures were then used for the aeroelastic analysis, with procedure interfacing accomplished through use of the NASTRAN-produced restart tape. Stiffness matrices were used in static aeroelastic analyses; natural vibration modes were used for flutter and flight control system definition. Various level 12 NASTRAN characteristics were discovered and are discussed; e.g., the ability to solve singular matrices in rigid format 1, run times using multipoint constraints, restart tape problems, and the inaccurate stresses from the quad membrane when used with anisotropic materials. Author

N72-32883* Kleber-Colombes (France).
NONAPPLICABILITY OF LINEAR FINITE ELEMENT PROGRAMS TO THE STRESS ANALYSIS OF TIRES
Michel Durand and Etienne Jankovich *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 263-276 refs (For availability see N72-32867 23-32)

CSCL 20K

A static finite element stress analysis of an inflated radial car tire was carried out. The deformed shape of the sidewall presents outward bulging. The analysis of a homogeneous isotropic toroidal shell shows that the problem is common to all solids of this type. The study suggests that the geometric stiffness due to the inflation pressure has to be taken into account. Also, the resulting large displacements make it necessary for the geometry to be updated at each load step. Author

N72-32884* Army Air Mobility Research and Development Lab., Fort Eustis, Va.

A COMPARISON OF THE CAPABILITIES OF THREE FINITE ELEMENT PROGRAMS

David D. Loendorf *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 277-287 refs (For availability see N72-32867 23-32)

CSCL 20K

Three finite element programs are compared to assess their capabilities as an analysis tool in a structural design process. Because of the need for repetitive analyses as an integral part of a design loop, a candidate program must be capable of handling large problems, operate efficiently, and be readily adaptable for use in computer-aided design. The three programs considered in the study, ELAS,SNAP, and NASTRAN, range from a relatively small finite element program limited to static structural analysis (ELAS) to a large complex general analysis system (NASTRAN). Results are given for comparative speeds and computer resources required for each program in the analysis of sample fuselage problems representative of practical aircraft design. Author

N72-32885* Lockheed-California Co., Burbank.

ADAPTATION OF NASTRAN TO AN INTEGRATED SYSTEM OF STRUCTURAL DESIGN ANALYSIS

Gernot W. Haggenmacher *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 289-302 refs (For availability see N72-32867 23-32)

CSCL 20K

Efforts to integrate NASTRAN into a complete structural analysis system for use by large airframe design projects are discussed. NASTRAN was implemented as a major finite element structural analysis program to determine the static and dynamic behavior of complete airframes, as well as structural components. This requires modifications and additions to NASTRAN, to communicate with an existing system, and to provide facilities needed to work within the integrated structural analysis. For this purpose, several special DMAP modules were developed and introduced into the CALAC version of the NASTRAN system. Author

N72-32886* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

COMPARISON OF NASTRAN AND STARDYNE STATIC ANALYSIS OF A GRAPHITE FIBER REINFORCED PLASTIC TRUSS STRUCTURE

George H. Honeycutt, Frank J. On, and Stuart L. Hanlein *In its* NASTRAN: Users' Experiences Sep. 1972 p 303-314 refs (For availability see N72-32867 23-32)

CSCL 20K

A static and buckling analysis of the ATS-F&G spacecraft reflector support truss (RST) and bridge truss assembly using NASTRAN was conducted. The RST is fabricated from a new material, graphite fiber reinforced plastic. A comparison is made with the NASTRAN results and the results of a similar analysis conducted using the stardyne program. The results of an actual static load test are also compared. Author

N72-32887* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AN ISOPARAMETRIC QUADRILATERAL MEMBRANE ELEMENT FOR NASTRAN

Howard M. Adelman, Joseph E. Walz, and James L. Rogers, Jr. *In its* NASTRAN: Users' Experiences Sep. 1972 p 315-336 refs (For availability see N72-32867 23-32)

CSCL 20K

The geometric and kinematic properties of the element are described, along with development of the matrices and vectors which characterize the element. The necessity for considering small deviations from element planeness is discussed, and the approach taken to account for these deviations is described. The improved accuracy over the existing quadrilateral membrane is indicated by a sample calculation for which an analytical solution is available from beam theory. For the same finite element idealization, the errors in maximum displacement and stress were significantly reduced. Author

N72-32888* Grumman Aerospace Corp., Bethpage, N.Y.

SOME ASPECTS OF THE NASTRAN PROGRAM OUTPUT

David J. Gregory *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 337-360 ref (For availability see N72-32867 23-32)

CSCL 20K

The NASTRAN program output is discussed from a structural analysts point of view, and the simple modifications which were made to the program in order to improve it are also described. The convenience of the output for use in original design work is critically appraised and compared with the output from ASTRAL. It is shown that considerable hand calculation is necessary in order to extract useful load distribution data from the available NASTRAN output. For this reason, some effort was directed toward providing additional force output for the NASTRAN shear panel element. Author

N72-32889* McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

A DESIGN STUDY FOR THE ADDITION OF HIGHER ORDER PARAMETRIC DISCRETE ELEMENTS TO NASTRAN

E. L. Stanton *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 361-373 refs (For availability see N72-32867 23-32)

CSCL 20K

The addition of discrete elements to NASTRAN poses significant interface problems with the level 15.1 assembly modules and geometry modules. Potential problems in designing new modules for higher-order parametric discrete elements are reviewed in both areas. An assembly procedure is suggested that separates grid point degrees of freedom on the basis of admissibility. New geometric input data are described that facilitate the definition of surfaces in parametric space. Author

N72-32890* Computer Sciences Corp., El Segundo, Calif.

MODIFICATIONS AND ADDITIONS TO NASTRAN AT MARSHALL SPACE FLIGHT CENTER, 1969 - 1972 c08

Archie J. Jordon, Jr. and William G. Ward *In* NASA. Langley Res. Center NASTRAN: Users' Experiences (For availability see N72-32867 23-32)

CSCL 09B

Modifications to NASTRAN code which result from the location, identification, and correction of errors or operational problem areas are reviewed. Addition of improved capability which is structural, executive system oriented, or utility in nature is also considered. NASTRAN efficiencies and inefficiencies are studied. Author

N72-32891* Naval Ship Research and Development Center, Washington, D.C.

THE NASTRAN CONTOUR PLOTTER c08

Barbara M. Kelly *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 385-397 refs (For availability see N72-32867 23-32)

CSCL 09B

The NASTRAN contour plotter, a group of subroutines and modifications to the NASTRAN plot module, enables contour

lines to be superimposed on the plot of the structural model or on an outline of the structural model. The NASTRAN contour plotter can be incorporated into NASTRAN version 12. Consistent with the NASTRAN computer program, it is operational on the IBM 360, the CDC 6000, and the Univac 1108 computers on a variety of plotter hardware. Author

N72-32892* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
NASTRAN DATA GENERATION AND MANAGEMENT USING INTERACTIVE GRAPHICS c08
M. Smootkatow and Barry M. Cooper *In* NASA. Langley Res. Center NASTRAN: Users' experiences Sep. 1972 p 399-406 (For availability see N72-32867 23-32)
(Contract NAS7-100)
CSCL 09B

A method of using an interactive graphics device to generate a large portion of the input bulk data with visual checks of the structure and the card images is described. The generation starts from GRID and PBAR cards. The visual checks result from a three-dimensional display of the model in any rotated position. By detailing the steps, the time saving and cost effectiveness of this method may be judged, and its potential as a useful tool for the structural analyst may be established. Author

N72-32893* Naval Ship Research and Development Center, Bethesda, Md. Computation and Mathematics Dept.
THE BANDIT COMPUTER PROGRAM FOR THE REDUCTION OF MATRIX BANDWIDTH FOR NASTRAN c08
Gordon C. Everstine *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 407-414 refs (For availability see N72-32867 23-32)
CSCL 09B

A computer program, BANDIT, is described which was developed for use as a preprocessor to NASTRAN to automatically resequence the grid point numbers for reduced matrix bandwidth. The BANDIT program accepts a standard NASTRAN data deck as input, resequences the grid point numbers for reduced bandwidth, and generates a set of SEQGP cards for insertion into the NASTRAN bulk data deck. BANDIT uses the Cuthill-McKee strategy for resequencing grid points. The program is operational on the CDC 6000 series of computers, the IBM 360, and the Univac 1108. Author

N72-32894* Louisiana Polytechnic Inst., Ruston.
USE OF NASTRAN AS A TEACHING AID c08
Michael T. Wilkinson *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 415-419 refs (For availability see N72-32867 23-32)
CSCL 09B

Recent experiences with incorporating NASTRAN as a teaching tool in undergraduate courses was found pedagogically sound. Students with no previous computerized structures background are able to readily grasp the program's logic and begin solving realistic problems rapidly. The educational benefit is significantly enhanced by NASTRAN's plotting feature. However, the cost of operating the level 12 version makes the program difficult to justify. Author

N72-32895* Control Data Corp., Minneapolis, Minn. Professional Services Div.
STRUCTURAL ANALYSIS FOR A 40-STORY BUILDING
Lo-Ching Hua *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 421-427 (For availability see N72-32867 23-32)
CSCL 20K

NASTRAN was chosen as the principal analytical tool for structural analysis of the Illinois Center Plaza Hotel Building in Chicago, Illinois. The building is a 40-story, reinforced concrete structure utilizing a monolithic slab-column system. The displacements, member stresses, and foundation loads due to wind load, live load, and dead load were obtained through a series of NASTRAN runs. These analyses and the input technique are described. Author

N72-32896* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPLICATIONS OF NASTRAN TO NUCLEAR PROBLEMS
Embertus Spreeuw *In its* NASTRAN: Users' Experiences Sep. 1972 p 429-441 refs (For availability see N72-32867 23-32)
CSCL 20K

The extent to which suitable solutions may be obtained for one physics problem and two engineering type problems is traced. NASTRAN appears to be a practical tool to solve one-group steady-state neutron diffusion equations. Transient diffusion analysis may be performed after new levels that allow time-dependent temperature calculations are developed. NASTRAN piecewise linear anlaysis may be applied to solve those plasticity problems for which a smooth stress-strain curve can be used to describe the nonlinear material behavior. The accuracy decreases when sharp transitions in the stress-strain relations are involved. Improved NASTRAN usefulness will be obtained when nonlinear material capabilities are extended to axisymmetric elements and to include provisions for time-dependent material properties and creep analysis. Rigid formats 3 and 5 proved to be very convenient for the buckling and normal-mode analysis of a nuclear fuel element. Author

N72-32897* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASTRAN THERMAL ANALYZER: A GENERAL PURPOSE FINITE ELEMENT HEAT TRANSFER COMPUTER PROGRAM c33
Hwa-Ping Lee and James B. Mason *In its* NASTRAN: Users' Experiences Sep. 1972 p 443-454 refs (For availability see N72-32867 23-32)
CSCL 20M

The program not only can render temperature distributions in solids subjected to various thermal boundary conditions, including effects of diffuse-gray thermal radiation, but is fully compatible in capacity and in the finite-element model representation with that of its structural counterpart in the NASTRAN system. The development history of the finite-element approach for determining temperatures is summarized. The scope of analysis capability, program structure, features, and limitations are given with the objective of providing NASTRAN users with an overall veiw of the NASTRAN thermal analyzer. Author

N72-32898* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
VIEW: A MODIFICATION OF THE RAVFAC VIEW FACTOR PROGRAM FOR USE WITH THE NASTRAN THERMAL ANALYZER c08
Edward F. Puccinelli and Clifton E. Jackson, Jr. *In its* NASTRAN: Users' Experiences Sep. 1972 p 455-463 refs (For availability see N72-32867 23-32)
CSCL 09B

The NASTRAN thermal analyzer will include the capability to perform complete thermal analyses on structures. One of the inputs to NASTRAN required to simulate radiative heat transfer between surfaces will be the view factors (also called shape factors, form factors, configuration factors) between those surfaces. The purpose of the VIEW program is to compute these view factors and produce appropriate RADMTX and RADLST output to be used as NASTRAN bulk data. Author

N72-32899* Computer Sciences Corp., El Segundo, Calif.
STRUCTURAL DYNAMIC AND THERMAL STRESS ANALYSIS OF NUCLEAR REACTOR VESSEL SUPPORT SYSTEM
James Chi-DianGo *In* NASA. Langley Res. Center NASTRAN: Users' Experience Sep. 1972 p 465-475 ref (For availability see N72-32867 23-32)
CSCL 20K

A nuclear reactor vessel is supported by a Z-ring and a box ring girder. The two proposed structural configurations to transmit the loads from the Z-ring and the box ring girder to the foundation are shown. The cantilever concrete ledge transmitting

the load from the Z-ring and the box girder via the cavity wall to the foundation is shown, along with the loads being transmitted through one of the six steel columns. Both of these two supporting systems were analyzed by using rigid format 9 of NASTRAN for dynamic loads, and the thermal stresses were analyzed by AXISOL. The six column configuration was modeled by a combination of plate and bar elements, and the concrete cantilever ledge configuration was modeled by plate elements. Both configurations were found structurally satisfactory; however, nonstructural considerations favored the concrete cantilever ledge. Author

N72-32900* AiResearch Mfg. Co., Torrance, Calif.
HIGH PRESSURE TURBINE BLADE STRESS ANALYSIS
c15
Robert R. VanNimwegen and Samuel Tepper *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 477-484 (For availability see N72-32867 23-32)
CSCL 21E

Combinations of high temperature gradients associated with strong transients in both temperature and rotational speed fields are discussed. Blade definition and results of the analysis are shown. Since the same model should later be used to define some dynamic characteristics and certain areas would require a nonlinear analysis, NASTRAN was chosen as a convenient program to manage the several alternatives. Author

N72-32901* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPLICATIONS OF NASTRAN SUBSTRUCTURING
R. Narayanaswami *In its* NASTRAN: Users' Experiences Sep. 1972 p 485-496 refs (For availability see N72-32867 23-32)
CSCL 20K

The application of substructuring techniques are described for two example problems, a square plate and the static analysis of a frame-wall interaction problem in multistory structures. A DMAP routine for calculating the multipoint constraint forces is presented. Author

N72-32902* Grumman Aerospace Corp., Bethpage, N.Y.
DESIGN OF NASTRAN DEMONSTRATION PROBLEMS
c08
Alvin Levy *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1972 p 497-501 refs (For availability see N72-32867 23-32)
CSCL 09B

Criteria and procedures are supplied for the selection, evaluation, and maintenance of an optimum set of demonstration problems to be used for the purposes of checking out the NASTRAN program and demonstrating NASTRAN's capabilities. Also, suggestions are made for a new demonstration problem manual that will better assist the user community in the selection of NASTRAN options and preparation of input data, as well as allow the user to isolate the various options used in the set of demonstration problems. Author

N72-32903# Loughborough Univ. of Technology (England). Dept. of Mathematics.
THE APPLICATION OF FEASIBLE DIRECTION METHODS OF NONLINEAR PROGRAMMING TO SOME STRUCTURAL OPTIMIZATION PROBLEMS
B. M. E. DeSilva 13 Jan. 1972 29 p refs Present at Conf. on Computer Optomization of Struct., Swansea, Engl., 9-13 Jan. 1972 Submitted for publication
(Math-Res-9) Avail: NTIS HC $3.50

The possibility of developing systematic optimization packages for measuring the optimality of structural systems is considered. These optimization problems are characterized by nonlinear behavioral constraints which are not amenable to direct analytical representation. A major part of the synthesis capability is the development of optimization techniques for redesign from the boundary of a behavioral constraint. These modes consist in travel either along the constraints or away from them, and are based on the nonlinear programming concepts. The applications of these techniques to some structural optimization problems are described. Author

N72-32904*# Scientific Translation Service, Santa Barbara, Calif.
OPTIMIZATION OF STRUCTURES WITH CONSTRAINTS ON DYNAMIC AND FREQUENCY CHARACTERISTICS
Yu. M. Pochtman Washington NASA Sep. 1972 5 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 203, no. 2, 11 Mar. 1972 p 307-308
(Contract NASw-2035)
(NASA-TT-F-14540) Avail: NTIS HC $3.00 CSCL 13M

A discussion of minimum weight elastic structure designs under dynamic loads, with certain constraints imposed on stress displacements and natural oscillation frequencies, is presented. A computer program was formulated and a random search procedure given for solving this problem. The procedure was applied to the synthesis of a perimeter-hinged, three-layer plate. Author

N72-32905*# Techtran Corp., Glen Burnie, Md.
A THEORY OF CALCULATION OF FLUTTER VIBRATIONS IN SUBSONIC FLOWS
W. Roth Washington NASA Sep. 1972 23 p refs Transl. into ENGLISH from Acta Mechanica, v. 6, 1968 p 22-41 Presented in abbreviated form as "A Contribution to the Calculation of Flutter Oscillations" at the GAMM Congr., Zurich, 1967
(Contract NASw-2037)
(NASA-TT-F-14576) Avail: NTIS HC $3.25 CSCL 20K

Critical flutter velocity for a membrane in a nonconservative system is considered. It is shown that the damping forces have a destabilizing effect and that a discontinuity appears in the stability criterion which depends on the damping coefficient and is characteristic of nonconservative systems. By means of this theory, the flutter of weather vanes or sails, as well as the related traveling transverse waves, can be explained. Author

N72-32906# Lockheed Missiles and Space Co., Palo Alto, Calif.
ON THE STEADY CREEP OF SHELLS OF REVOLUTION IN THE TRESK CRITERION CASE
O. N. Shablyi and P. I. Danchak [1972] 7 p refs Transl. into ENGLISH from Prikl. Mekh. (Kiev.), v. 8, no. 5, 1972 p 13-20
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

A surface whose equation is satisfied by the stress resultants and moments during shell strain is constructed, on the basis of the Tresk criterion. The dependencies between the reduced stress resultants and moments, and the strain rates for all possible regular creep processes which can be realized over the shell thickness, are represented in equation form. An annular plate problem is considered as an example. K.P.D.

N72-32907# Department of Supply, Melbourne (Australia).
FATIGUE TESTING: OBJECTIVES, PHILOSOPHIES AND PROCEDURES
J. Y. Mann Feb. 1972 67 p refs
(ARL/SM-336) Avail: NTIS HC $5.50

A review is presented of the general problems of fatigue failure which lead to the necessity for the fatigue testing of materials, components, and structures. The objectives of a fatigue testing program are discussed and the philosophies associated with various testing procedures (constant amplitude, program loading, random loading, and flight simulation) are outlined. An indication of the significance of the variables to be considered in setting up a representative fatigue test is given, together with the application of statistical methods for the estimation of service lives. Recommendations are made regarding the various parameters involved in carrying out a simulated laboratory fatigue test. These include the test spectrum, periodic loads, load sequence, maximum and minimum loads, numbers of load levels, and cyclic frequency. Author

N72-32908# Mitsubishi Heavy-Industries, Ltd., Tokyo (Japan).
FINITE ELEMENT METHOD WITH CONSIDERATION TO THE CONTINUITY OF NORMAL SLOPE
Koichi Arai Jul. 1972 8 p refs
(TB-79) Avail: NTIS HC $3.00

A method is described of stress analysis of arbitrary shell by the use of the finite element method which employs Lagrange multiplier to obtain continuity of normal slopes of elementary boundaries. The displacement field is expressed by complete cubic polynominals with 10 parameters which consist of 3 sets of 3 parameters at each node, namely one displacement and two slopes (or rotations) and an integrated value of displacement over an element. In addition to the stationary condition of strain energy, the requirement of normal slope continuity is achieved by introducing Lagrange multiplier for the difference of integrated value of normal slope on common side of two adjacent elements. As this multiplier turns to the averaged value of normal bending moment on element side, this method has a character of hybrid procedure. This element yields linear stress distribution within an element, while in-plane stress is assumed to be constant. This combination of stress field may be reasonable from the viewpoint that bending stress is greater than membrane (in-plane) stress and has steeper gradient. Author

N72-32909# National Research Council of Canada, Ottawa (Ontario).
AXISYMMETRIC CONTACT PROBLEM FOR LINEAR VISCOELASTIC BODIES
A. B . Efimov 1972 20 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. 1, Mat., Mekhan. (Moscow), v. 2, 1966 p 120-127
(NRC-TT-1572) Avail: NTIS HC $3.00

An axially symmetric die of arbitrary section in contact with a viscoelastic half-space was investigated in the case of noncommutative operators. Contact pressure, displacement of the die, stresses, and displacements in the half-space were determined. Solutions were obtained for repeated kinematic loading unloading. It is shown that the plane problem and other contact problems of viscoelasticity are solvable by the same method, and solutions have similar properties. Author

N72-32910*# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
GENERALIZED CHARACTERISTICS METHOD FOR ELASTIC WAVE PROPAGATION PROBLEMS
M. Ziv [1971] 26 p refs Prepared for JPL
(Contract NAS7-100; Proj. 160-080)
(NASA-CR-128216; TAE-147) Avail: NTIS HC $3.50 CSCL 20N

Characteristic equations were derived in generalized curvilinear coordinates. Linear elastic, isotropic, and homogeneous constitutive equations were used in the derivation. The generalized characteristic equations lend themselves to any requirements of space, dimension, and geometry. A simple boundary value problem was solved to indicate the applicability of these equations. Author

N72-32911*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
STATIC STRUCTURAL TESTS OF A 1.5-METER DIAMETER FABRIC ATTACHED INFLATABLE DECELERATOR
Conrad M. Willis and Martin M. Mikulas, Jr. Washington Oct. 1972 32 p refs
(NASA-TN-D-6929; L-8389) Avail: NTIS HC $3.00 CSCL 20L

Meridional tape forces, permeability, and change in model contours were measured on the aft half of a 1.5-m-diameter attached inflatable decelerator (AID). Inflation pressures up to 103 kN per square meter and external pressures of 0.14 to 102 kN per square meter were used. The results indicated that the model stresses were near the desired isotensoid condition. Future AID designs should consider both stiffness and strength of the meridional tapes to obtain the optimum division of load between tapes and fabric. Permeability of pressurized fabric structures is a few orders of magnitude higher than that obtained in the standard low-pressure test on material specimens. Author

N72-32912# Joint Publications Research Service, Arlington, Va.
TESTING METALS FOR TENSION, IMPACT, AND VARIABLE LOADS
22 Sep. 1972 136 p Transl. into ENGLISH from the book "Mekhanicheskiye Ispytaniya Metallov" Moscow, Metallurgiya Publishing House, 1971
(JPRS-57075) Avail: NTIS HC $9.00

The report discusses methods of testing metals for tension, impact, and variable loads. Author

N72-32913# National Bureau of Standards, Washington, D.C.
THE EFFECTS OF SONIC BOOM AND SIMILAR IMPULSIVE NOISE OF STRUCTURES
31 Dec. 1971 21 p refs Sponsored by EPA
(NTID300.12) Avail: SOD $1.00

A brief discussion is given of the physical nature of sonic booms, and other impulsive noises, and the parameters, such as over-pressure, duration, and mechanical impulse, which are used to characterize booms. This is followed by an overview of the response of structures, particularly buildings, to sonic booms and a review of the damage history observed due to supersonic overflights. A summary of the observed effects of impulsive noise on terrain and natural structures is included. Author

N72-32914# Brown Univ., Providence, R.I. Div. of Engineering.
A SURVEY OF DIRECT INTEGRATION METHODS IN STRUCTURAL DYNAMICS
Robert E. Nickell Apr. 1972 32 p refs
(Contract N00014-67-A-0191-0007)
(AD-743984; TR-9) Avail: NTIS CSCL 13/13

Several alternative methods for directly integrating the governing equations of motion of structural dynamics are reviewed. First, the characteristics of the matrix equations are examined (e.g.; the spread in structural eigenvalues, or stiffness; the bandwidth and sparseness; and the frequency spectrum of the forcing function). Then, the criteria that can be used to select a direct integration algorithm are discussed (e.g.; the artificial damping, the periodicity error). Emphasis is given to results obtained for the Houbolt, Newmark and Wilson operators, and their comparison to a class of stiffly stable operators. Recent application of these operators to nonlinear problems is discussed. Author (GRA)

N72-32915# Virginia Polytechnic Inst., Blacksburg. Coll. of Engineering.
AN ASSESSMENT OF FACTORS INFLUENCING DATA OBTAINED BY THE PHOTOELASTIC STRESS FREEZING TECHNIQUE FOR STRESS FIELDS NEAR CRACK TIPS
M. A. Schroedl, J. J. Mcgowan, and C. W. Smith Apr. 1972 27 p refs Presented at Symp. on Fracture and Fatigue, Washington, D. C., 3-5 May 1972
(Contract DAAF07-69-C-0444; Proj. Themis)
(AD-742662; VPI-72-6) Avail: NTIS CSCL 20/11

Factors which influence crack tip stress field data are identified as: (1) Non-linear zone near crack tip due to crack blunting. (2) Normal stress parallel to crack surface. (3) Location of region for data retrieval. The Kolosoff-Inglis solution is used in order to assess effects of crack tip blunting. A set of stress freezing photoelastic experiments are conducted on plates containing through cracks and results are compared with the Westergaard solution in order to assess the effect of Item 2 using appropriate Item 3 locations. A data conditioning computer program is employed to yield accurate values of the stress intensity factor from photoelastic data. Author (GRA)

N72-32916# Naval Civil Engineering Lab., Port Hueneme, Calif.
LAYERED PAVEMENT SYSTEMS. PART 1: LAYERED SYSTEM DESIGN. PART 2: FATIGUE OF PLAIN

CONCRETE Technical Report, Apr. 1970 - Mar. 1971
J. B. Forrest, M. G. Katona, and D. F. Griffin Apr. 1972 78 p refs
(YF38534002)
(AD-742337; NCEL-TR-763-Pt-1-Pt-2) Avail: NTIS CSCL 01/5

The report describes a recent Naval Civil Engineering Laboratory study of airfield pavement overlay design that indicates that elastic layered analysis may be a better design approach than any other currently available technique. A finite element theory of analysis has been developed that considers horizontal sliding between layers, and the superimposed load effects of multiple-wheel landing gear. This theory also provides for automatic finite element mesh generation, and automatic plotting of stress, strain, and displacement output data. The report also presents a review of the literature about fatigue of plain concrete. It reveals information about beam and cylinder testing but discloses no conclusive experimental work on the fatigue behavior of uniformly supported pavement slabs. Fatigue behavior estimates based upon beam and cylinder tests would necessarily have to be conservative and therefore self-defeating insofar as achieving economy of design by adoption of minimum feasible thickness of pavement slab overlays. Author (GRA)

N72-32917# George Washington Univ., Washington, D.C. Dept. of Civil Mechanical and Environmental Engineering.
FURTHER STUDY OF SNAP THROUGH BEHAVIOR OF CLAMPED SPHERICAL CAPS
Barry I. Hyman Dec. 1971 28 p refs
(Contract N00014-66-C-0154)
(AD-741198; TR-4) Avail: NTIS CSCL 20/11

A previous approximate analysis of the subject problem is modified in this paper by including terms which had previously been neglected in the strain energy integral. The governing equations for the displacements are expressed in uncoupled form and a Frrobenius type solution is obtained. By using a strain related parameter as the independent variable, the complete load deflection curve of the cap is generated without recourse to numerical iteration procedures. Author (GRA)

N72-32918# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
STRESS-WAVE PROPAGATION AND DYNAMIC EFFECTS IN SHELLS (SPADES). MICROMECHANICAL STRESS-WAVE RESPONSE OF 3-D QUARTZ PHENOLIC. BOOK 1: DEVELOPMENT OF BLOCH-FOURIER ANALYSIS Final Technical Report, Jun. 1970 - Dec. 1971
J. C. Peck, E. L. Palacol, and H. Chao Jun. 1972 261 p refs
(Contract F04701-70-C-0159)
(AD-743898; MDC-G2709-Bk-1; SAMSO-TR-72-68-Bk-1) Avail: NTIS CSCL 11/4

The report describes the mathematical development and computer-code implementation of an analysis designed to calculate the micromechanical stress-wave response of composite materials. Such information is essential to understand and minimize gross fracture and mechanical property degradation in composite materials. The analysis utilizes the Bloch sinusoidal-wave modes, which are found using a single unit cell of the composite, and superposes them by Fourier series in time to calculate the transient response of slabs to surface loads. Two computer codes are used: (1) the Bloch code, which determines the modes by a finite-element technique; and (2) the Fourier code, which superposes the modes and determines the transient response. The codes are set up to handle two-dimensional rectangular geometries. The prime advantage of the Bloch-Fourier analysis over two-dimensional direct-integration codes is that it can solve problems with large numbers of repeating fiber cells in the propagation direction. Such solutions would be prohibitively expensive or completely unfeasible with direct-integration codes. A variety of check cases have been solved with the codes.
Author (GRA)

N72-32919# Massachusetts Inst. of Tech., Cambridge. Acoustics and Vibration Lab.
VIBRATION OF A CAVITY-BACKED PANEL
Rocky Richard Arnold · Dec. 1971 41 p refs
(Contract N00014-67-A-0204-0002)
(AD-743865; A/V-70208-7) Avail: NTIS CSCL 13/10

The vibration of a thin flexible membrane is analyzed for an intermediate range of acoustic frequencies. The results show that the panel natural frequency is shifted and that it is possible to eliminate panel motion by suitable cavity construction. Theory is presented to explain the phenomenon. Author (GRA)

N72-32920# National Materials Advisory Board, Washington, D.C.
TESTING FOR PREDICTION OF MATERIAL PERFORMANCE IN COMPONENTS AND STRUCTURES Final Report
May 1972 138 p refs
(Contract DA-49-083-OSA-3131)
(AD-743991; NMAB-288) Avail: NTIS CSCL 14/4

A survey has been made of problems of testing materials to predict their performance in components and structures. The viewpoint is that of the designer and those whom he serves. The report discusses the role of testing in arriving at design decisions. The report gives checklists and other practical hints for deciding when to test and when testing could be superfluous. Appendices furnish useful reference and instructional material.
Author (GRA)

N72-32921# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
MATERIAL NONLINEARITY EFFECTS IN OPTIMIZATION CONSIDERATIONS OF STIFFENED CYLINDERS AND INTERPRETATION OF TEST DATA SCATTER FOR COMPRESSIVE BUCKLING Final Report
J. Mayers and E. Meller Fort Eustis, Va. Army Air Mobility R and D Lab. Mar. 1972 62 p refs
(Contract DAAJ02-70-C-0075; DA Proj. 1F0-61102-A-33F)
(AD-743951; USAAMRDL-TR-71-70) Avail: NTIS CSCL 20/11

A limited optimization study is undertaken of imperfect, eccentrically stiffened 2024-T3 aluminum alloy cylinders under axial compression based on (1) a linear theory with applied buckling load reduction factors to account for initial imperfections and inelasticity and (2) a kinematically and constitutively nonlinear maximum strength analysis. The latter is shown to be less conservative for the most efficient design: combined stringer- and ring-stiffening. Credibility of the maximum strength approach is domonstrated through its use in correlating experimental results obtained for 10- and 14-in. diameter steel cylinders having different proportional-limit stresses, respectively. Finally, material nonlinearity is shown to offer a plausible qualitative explanation for a significant amount of the scatter in axial compression tests for cylinders with radius-to-thickness ratios of practical interest. Author (GRA)

N72-32922# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
APPLICATION OF VARIATIONAL CALCULUS METHODS TO THE SOLUTION OF PROBLEMS OF OPTIMUM HEATING OF THIN SHELLS
Ya. I. Burak, E. I. Grigolyuk, and Ya. S. Podstrigach 3 Apr. 1972 14 p refs Transl. into ENGLISH from the book "Tr., 7th Vses. Konf. po Teorii Obolochek i Plastinok, Dnepropetrovsk, 1969" Moscow, 1970 p 101-109
(AD-744140; FTD-HC-23-1798-71) Avail: NTIS CSCL 13/13

The authors discuss the problem of determining those thermal fields in thin, elastic shells that, within the limits of the given heating conditions (limitations on the thermal field and the shell's thermoelastic state), provide a comparatively low level of thermal stresses. As the optimality criterion, the authors stipulate the minimum of the functional of the shell's elastic energy. They formulate a corresponding variational problem and derive additional relationships (Euler equations) that, together with the equations for the thermoelasticity of thin shells, constitute a complete system of equations for the determination of the extreme temperature load and the stressed and deformed state of the shell. Author (GRA)

N72-32923# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL INVESTIGATION OF THE STABILITY OF CYLINDRICAL SHELLS IN TORSION
V. V. Mikhailov and V. O. Chystyukhin 21 Mar. 1972 7 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. SSR (Kiev), no. 1, 1967 p 517-519
(AD-744148; FTD-HC-23-69-72) Avail: NTIS CSCL 13/13

The article presents experimental data relevant to the magnitude of the lower critical load and to the character of corrugation formation in cylindrical shells subjected to torsion. The diagram of the arrangement with the aid of which experiments were performed is represented in a figure. The basic elements of the arrangement are two strictly parallel disks and a shaft. The top dish is rigidly connected with the shaft by means of a key. The shaft at its butt end is rigidly fixed on a plate by means of a threaded spindle. Within the gaps of the disks with the aid of rings and bolts, the ends of a tested shell are fastened. When the nut, which is in the form of a hand wheel, is tightened, torsion of the shell takes place.
Author (GRA)

N72-32924# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN IMPROVED THEORY OF ANISOTROPIC SHELLS
S. A. Ambartsumyan 3 Apr. 1972 12 p refs Transl. into ENGLISH from the publ. "Trudy 7 Vsesoyuznoy Konferentsii po Teorii Obolochek i Plastinok, Dnepropetrovsk, 1969" Moscow, Nauka, 1970 p 58-64
(AD-744138; FTD-HC-23-1794-71) Avail: NTIS CSCL 13/13

In the work a new, improved theory of anisotropic shells is constructed, based on the following assumptions: (a) in determining given deformations it is considered that the given tangential stresses do not differ from the given corresponding stresses which are located according to classical theory; (b) deformation given and normal stress given do not differ from the given corresponding values of classical theory. As usual, the shell is related to a triorthogonal system of curvilinear coordinates given. The difference in the proposed theory, as opposed to those known before, consists of the fact that here, there is no widespread hypothesis about the independence of given normal motion from coordinate.
Author (GRA)

N72-32925# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
QUESTION OF RELAXATION OSCILLATIONS OF A SYSTEM WITH DRY FRICTION
S. V. Baev 29 Mar. 1972 12 p refs Transl. into ENGLISH from Teoriya Koletaniyi Dinam. Mostov (Kiev), no. 89, 1969 p 43-50
(AF Proj. 7343)
(AD-744261; FTD-HC-23-9-72) Avail: NTIS CSCL 20/11

The steady state motion of a self oscillating system consisting of an elastically fastened load moving along an infinite belt is considered. Forces of dry friction and viscous resistance act on the load. It is evident from the solution of the equations of motion obtained analytically that the amplitude and period of the oscillations rise with a decrease in the velocity of the system and an increase in the load.
Author (GRA)

N72-32926# California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
ON THE UNIQUENESS OF SINGULAR SOLUTIONS TO BOUNDARY-INITIAL VALUE PROBLEMS IN LINEAR ELASTODYNAMICS
G. Samuel Brockway May 1972 63 p refs Sponsored in part by NSF
(Contract N00014-67-A-0094-0020; NR Proj. 064-031)
(AD-744346; TR-25) Avail: NTIS CSCL 20/11

The classical uniqueness theorem for the traction problem in the linearized dynamical theory of possibly non-homogeneous and anisotropic elastic solids has been generalized to encompass problems whose solutions exhibit suitably restricted stress-singularities. The types of singularities covered by the theorems obtained here include finite jump discontinuities in stress, which are familiar from known solutions to dynamical elasticity problems involving discontinuous data or non-matching boundary and initial conditions. In addition, one of the theorems established accommodates square-integrable isolated stress-infinites, such as those arising in connection with the focusing of elastic waves.
Author (GRA)

N72-32927# Army Foreign Science and Technology Center, Charlottesville, Va.
STRENGTH AND PLASTICITY
V. V. Sokolovskii 5 May 1972 622 p refs Transl. into ENGLISH of the book "Prochnost i Plastichnost" Moscow, Nauka, 1971
(AD-744495; FSTC-HT-23-1135-72) Avail: NTIS CSCL 20/11

General methods which are used to solve three-dimensional problems in the theory of elasticity for homogeneous, isotropic and anisotropic bodies and some of the fundamental static and dynamic problems for nonhomogeneous bodies were evaluated; the complete general solution of static planar problems and the development of fundamental methods in dynamics were also evaluated; new formulations and solutions of the fundamental contact problems and problems dealing with stress concentrations were evaluated; various general formulations and solutions in nonlinear theory and the equilibrium stability theory of three-dimensional bodies and generalized stability theory were evaluated; and various applications of elasticity theory to structural design: machine building, construction, transportation, mining, geophysics and other branches of technology were evaluated.
Author (GRA)

N72-32928# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RIGIDITY OF ELASTIC AND VISCO-ELASTIC CYLINDRICAL SHELLS FROM A REINFORCED MATERIAL
E. N. Sinitsyn 24 Mar. 1972 10 p refs Transl. into ENGLISH from the publ. "Vii Vsesoyuznoy Konferentsii po Teorii Obolochek i Plastinok. Trudy. Dnepropetrovsk, 1969" USSR, 1970 p 557-561
(AD-744252; FTD-HC-23-1804-71) Avail: NTIS CSCL 13/13

The effect of strains of lateral shearing on the rigidity of layer elastic and visco-elastic cylindrical shells in axial shrinking is investigated.
Author (GRA)

N72-32929# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THERMOELASTIC VIBRATIONS OF A CYLINDRICAL SHELL
A. P. Sinitsyn 23 Mar. 1972 12 p refs Transl. into ENGLISH from the publ. "VII Vsesoyuznoy Konferentsii po Teorii Obolochek i Plastinok Trudy. Dnepropetrovsk, 1969" USSR, 1970 p 551-556
(AD-744253; FTD-HC-23-1810-71) Avail: NTIS CSCL 13/13

The author studies the vibrations of a thin, closed, circular cylindrical shell that arise during sudden heating. He sets up differential equations of motion, considering the inertia or progressive motion, rotation, and displacement. The solution is in the form of series. For special cases of thermal distribution, the computations were done on a Ural-11 electronic digital computer, and the author derived the functions of the change in the shell's dynamic flexure. He discusses transversal and longitudinal vibrations and makes the transition to the solution of the wave problem for a semi-infinite shell.
Author (GRA)

N72-32930# Brown Univ., Providence, R.I. Div. of Engineering.
A NUMERICAL THERMO-MECHANICAL MODEL FOR THE WELDING AND SUBSEQUENT LOADING OF A FABRICATED STRUCTURE
Hugh D. Hibbitt and Pedro V. Marcal Mar. 1972 65 p refs
(Contract N00014-67-A-0191-0006)
(AD-744212; TR-2) Avail: NTIS CSCL 13/13

A numerical model is developed for the welding and

subsequent loading of a fabricated structure. The model treats the weld process as a thermo-mechanical problem. A finite element formulation derived from the uncoupled thermal and mechanical energy balances forms the basis of the model. During the development of the thermal model, two significant problems are discussed. One is the material nonlinearity, which manifests itself in the temperature dependence of the thermal properties, and in the fusion problem, where the material phase change is accompanied by a latent heat effect. During the second part of the work the mechanical model is described. This is an incremental finite element model in which the basic constitutive descriptions are time independent elastic-plastic behavior with temperature dependent properties, and a creep rate formulation for the time dependent behavior. The development is not based on thermodynamic theories but on direct extension of the classical (isothermal) theories. Finally the model is compared with simple bead-on-plate weld experiments, performed with high strength steels. Author (GRA)

N72-32931# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MULTIPLY-CONNECTED SANDWICH PLATES AND SHELLS
G. A. VanFofy 24 Mar. 1972 11 p Transl. into ENGLISH from Tr. 7th Vsesoyuzn. Konf. po Teorii Obolochek i Plastinok, Dnepropetrovsk, 1969 Moscow, Nauka Publishing House, 1970 p 120-125
(AD-744177; FTD-HC-23-1805-71) Avail: NTIS CSCL 20/11

The author develops methods for solving problems about the stressed state of isotropic sandwich plates and shells with rigid or light fillers, that are weakened by an arbitrary number of curvilinear cutouts. This investigation of the general case of multiply-connected spherical shells is based on the generalized theory of composition of cylindrical functions. Author (GRA)

33 THERMODYNAMICS AND COMBUSTION

Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects, and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

N72-32932 National Lending Library for Science and Technology, Boston Spa (England).
THE MECHANISM OF HEAT TRANSFER BETWEEN A SURFACE AND HETEROGENEOUS FLUIDISED BED OF GRANULAR MATERIAL
N. I. Gelperin Aug. 1972 36 p refs Transl. into ENGLISH from Khim. Prom. (Leningrad), no. 6, 1966 p 418-426
(NLL-RTS-7421) Avail: Natl. Lending Library, Boston Spa, Engl.: £3.60 or 12 NLL photocopy coupons

The mechanism of heat transfer in a heterogeneous fluidized bed, based on the conclusions of the packet theory, is analyzed, developed, and corrected. The mechanism is considered assuming the calculation of contact thermal resistance. K.P.D.

N72-32933*# New York Univ., N.Y. Aerospace Lab.
HEAT TRANSFER DISTRIBUTION ON A DISCONTINUOUSLY CONVECTIVE COOLED SURFACE
Renzo Piva and Richard Poch [1972] 42 p refs
(Grant NGR-33-016-131)
(NASA-CR-112047) Avail: NTIS HC $4.25 CSCL 20M

An active cooling scheme in which discrete cooling passages are used has been investigated. In this scheme, the coolant passages are placed perpendicular to the main stream direction. Streamwise temperature oscillations result from the highly cooled regions, near the coolant channels, being next to regions not directly cooled between the channels. These oscillations are found to be large in practical applications and therefore the wall temperature cannot be assumed constant as is frequently done in preliminary analysis, since the variations produce substantial deviation in the heat transfer rate. If the wall temperature distribution is calculated by the uncoupled internal heat conduction problem, the use of locally similar methods neglecting the wall temperature history introduce significant errors in the heat transfer calculations and therefore in the amount of coolant required. Author

N72-32934*# National Aeronautics and Space Administration, Washington, D.C.
HEAT TRANSFER INVESTIGATIONS OF AXISYMMETRIC BODIES AT HYPERSONIC SPEEDS BY MEANS OF INFRARED MEASUREMENT
Aug. 1972 29 p refs Transl. into ENGLISH of "Waermeuebergangsuntersuchungen an rotationssymmetrischen Flugkoerpermodellen bei Hyperschallanstroemung mittels des Infrarot-Messverfahrens" DFVLR, Inst. fuer Angew. Gasdyn., Porz, West Germany, rept. DLR-Mitt-71-19, 7 Oct. 1971 35 p
(NASA-TT-F-14509; DLR-Mitt-71-19) Avail: NTIS HC $3.50 CSCL 20M

A method of rapid heat transfer determination over surfaces of simple hypersonic models at a Mach number of 7.0 was examined and compared with other similar methods. The heat transfer measurements were performed in a hypersonic wind tunnel. Author

N72-32935*# National Aeronautics and Space Administration, Washington, D.C.
MEASUREMENT OF THE ENERGY SUPPLY FOR LOW VOLTAGE WIRE BRIDGE IGNITERS
Manfred Held Aug. 1972 40 p refs Transl. into ENGLISH from Explosivstoffe (Leipzig), v. 19, no. 2, 1971 p 25-38
(NASA-TT-F-14525) Avail: NTIS HC $4.00 CSCL 21B

Methods used to investigate the power required to ignite primers, electrical detonators, and electro-explosive devices in general are discussed. The measuring method must be chosen according to the kind of energy source. It makes a difference if the electro-explosive element must be ignited with energy stored in a capacitor, from a galvanic element with constant voltage, or from a magnetic generator with fixed current. The bridge wire, as used in the model P 65, shows a number of effects if it is started by different methods. Author

N72-32936*# Scientific Translation Service, Santa Barbara, Calif.
DIRECT CALCULATION OF SUBLIMATION ABLATION
H. Kubota Washington NASA Aug. 1972 50 p refs Transl. into ENGLISH of Japanese rept. NAL-TR-239 Tokyo, Natl. Aerospace Lab., Jun. 1971 p 1-25
(Contract NASw-2035)
(NASA-TT-F-14529; NAL-TR-239) Avail: NTIS HC $4.50 CSCL 20M

A direct and rapid method of calculating sublimation ablation for a hypersonic heat-shielding device is presented. This is based on a numerical analysis of the Hartree-Womersley method which reduces a parabolic partial differential equation to a corresponding ordinary one by means of a kind of implicit scheme. Author

N72-32937# National Aviation Facilities Experimental Center, Atlantic City, N.J.
EVALUATION OF INSULATION FOR CRASH FIRE PROTECTION OF NEW FLIGHT RECORDERS Final Report, Jul. 1971 - May 1972
Thomas Rust, Jr. Sep. 1972 40 p refs
(FAA Proj. 215-721-01X)
(FAA-NA-72-49; FAA-RD-72-75) Avail: NTIS HC $4.00

The evaluation of flight recorder insulation arrangements relative to their ability to provide thermal protection for record tapes under conditions of crash fire is discussed. The evaluation encompassed fire testing four different types of insulation

arrangements in accordance with three different time-temperature fire environments. It was found that a combination of high temperature insulation and a heat sink material employing water as the heat absorber provided the best protection for the record tapes when exposed to a realistic severe thermal environment.
Author

N72-32938*# Maryland Univ., College Park.
TRANSPORT PROPERTIES OF GASES AND BINARY LIQUIDS NEAR THE CRITICAL POINT
J. V. Sengers Washington NASA Sep. 1972 74 p refs
(Grant NGR-21-002-344)
(NASA-CR-2112) Avail: NTIS HC $3.00 CSCL 20M

A status report is presented on the anomalies observed in the behavior of transport properties near the critical point of gases and binary liquids. The shear viscosity exhibits a weak singularity near the critical point. An analysis is made of the experimental data for those transport properties, thermal conductivity and thermal diffusivity near the gas-liquid critical point and binary, diffusion coefficient near the critical mixing point, that determine the critical slowing down of the thermodynamic fluctuations in the order parameter. The asymptotic behavior of the thermal conductivity appears to be closely related to the asymptotic behavior of the correlation length. The experimental data for the thermal conductivity and diffusivity are shown to be in substantial agreement with current theoretical predictions.
Author

N72-32939*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CORRELATION FOR TEMPERATURE PROFILES IN THE PLANE OF SYMMETRY DOWNSTREAM OF A JET INJECTED NORMAL TO A CROSSFLOW
James D. Holdeman Washington Sep. 1972 29 p refs
(NASA-TN-D-6966; E-6860) Avail: NTIS HC $3.00 CSCL 20M

A correlation method is presented for approximating the temperature distribution in the plane of symmetry downstream of a jet injected normal to a uniform crossflow. Correlations are developed for the scaling parameters required to define the temperature profile at any desired location from the dimensionless universal form which has been experimentally observed. Profiles calculated using the correlation methods are compared with experimental profiles for several momentum and density ratios at various downstream distances.
Author

N72-32940*# Scientific Translation Service, Santa Barbara, Calif.
THE EFFECT OF THE START REACTION H2 PLUS O2 YIELDS 2OH ON THE TIME SEQUENCE OF HYDROGEN COMBUSTION IN THE AIR
J. Algermissen Washington NASA Sep. 1972 20 p refs
Transl. into ENGLISH from VDI-Forshungsh. (Duesseldorf), no. 549, 1972 p 33-38
(Contract NASw-2035)
(NASA-TT-F-14555) Avail: NTIS HC $3.00 CSCL 20M

Existing uncertainties concerning the velocity coefficients of the reactions initiating the combustion, i.e., the so-called start reactions, are examined. Based on comparative calculations, the effect of the most significant start reaction on the temporal variation of the combustible gas condition is demonstrated.
Author

N72-32941# Lockheed Missiles and Space Co., Palo Alto, Calif.
ON THE RATE OF PRESSURE DROP UPON INSERTION OF A COOLING SUBSTANCE IN A HALF-CLOSED VOLUME
B. T. Erokhin and Iu. I. Fedorov [1972] 6 p refs Transl. into ENGLISH from Fiz. Goreniya Vyzryva (USSR), v. 7, no. 4, 1971 p 492-497
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

The relationship of stable extinction of condensed systems for definite critical values of the rate of pressure drop in a half-closed volume is discussed. Numerical procedures to derive the critical value of the rate of the pressure drop are presented. It is determined that the pressure drop for a selected system and a given half-closed volume depends on the quantity of cooling substance introduced into the half-closed volume and its specific heat of vapor formation, the rate and conditions of injecting the cooling substance, and the rate of evaporation of the cooling substance.
Author

N72-32942# Lockheed Missiles and Space Co., Palo Alto, Calif.
CYCLE OF A THEORETICAL GAS REFRIGERATOR WITHOUT DEAD VOLUMES
A. D. Suslov [1972] 5 p Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Mashinostr. (Moscow), no. 6, 1972 p 85-90
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

An analysis is made of the theoretical cycle of a gas refrigerator with zero dead volume of the apparatus. If reciprocation from the cold to the warm zones and back is carried out at constant pressures, then the cycle is equivalent to the reverse Brighton cycle. Reciprocation at constant volume results in an increase in losses due to the irreversability of the heat exchange of the working body with the external heat sources and to the appearance of new losses due to the displacement of portions of the gas with different temperatures.
Author

N72-32943*# Scientific Translation Service, Santa Barbara, Calif.
TEMPERATURE STRESSES IN AN ANISOTROPIC CYLINDER
B. I. Birger Washington Aug. 1972 8 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Aviats. Tekh. (Kazan), v. 14, no. 1, 1971 p 24-28
(Contract NASw-2035)
(NASA-TT-F-14528) Avail: NTIS HC $3.00 CSCL 20M

Analysis of thermal stresses in an infinite, elastic, orthotropic cylinder subjected to axisymmetric heating is considered. Exact formulas were derived from constant elastic parameters and for elastic parameters varying along the radius. A computational algorithm is given for a laminated cylinder with an arbitrary number of layers. A system of first-order differential equations suitable for numerical integration was obtained.
Author

N72-32944# Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
A CALCULATION PROCEDURE FOR THE TRANSIENT AND STEADY STATE BEHAVIOUR OF SHELL AND TUBE HEAT EXCHANGERS
S. V. Patanker and D. B. Spalding Jul. 1972 30 p refs
(EF/TN/A/48) Avail: NTIS HC $3.50

A numerical procedure is described for the prediction of three-dimensional flow patterns in the shells of shell-and-tube heat exchangers, and of the temperature distributions in fluids. The capabilities of this procedure are demonstrated by calculations of the behavior of a particular exchanger, operating under a variety of steady state and transient conditions.
Author

N72-32945# Lockheed Missiles and Space Co., Palo Alto, Calif.
OPTIMAL PARAMETERS OF A LOW TEMPERATURE UNIT WITH A GAS REGENERATIVE CYCLE
I. V. Marfenina [1972] 6 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Mashinostr. (Moscow), no. 7, 1972 p 90-95
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

The gas regenerative cycle of a low temperature unit was investigated theoretically in order to determine the optimal parameters necessary to diminish energy expenditure.
Author

N72-32946*# Kanner (Leo) Associates, Redwood City, Calif.
A VARIABLE BLACKBODY FOR TEMPERATURES TO 4000 K INCLUSIVE
G. Friede and R. Mannkopff Washington NASA Feb. 1972 16 p refs Transl. into ENGLISH from Z. Angew. Phys. (Berlin), v. 28, no. 6, 1970 p 357-362 Sponsored by NASA
(NASA-TT-F-14464) Avail: NTIS HC $3.00 CSCL 20M

A variable, reproducible blackbody is described which consists of an electrical resistance-heated carbon tube, for temperatures from the glow point to the sublimation point of carbon. In the range up to 2300 K, the blackbody radiation could be compared with the response of a Siemens pyrometer; above that, a homemade pyrometer was used for measurements up to the sublimation temperature of carbon. The accuracy of the blackbody temperature setting is determined in practice by the accuracy of the pyrometric temperature measurements. At the sublimation point, there was a mean error in the average of 0.15 percent, corresponding to 6.3 K. Author

N72-32947*# National Aeronautics and Space Administration, Washington, D.C.
TO THE THEORY ON RADIATION TRANSFER IN A NONHOMOGENEOUS MEDIUM
V. V. Zheleznyakov Jun. 1972 16 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radiofiz. (Gorkiy), v. 9, no. 6, 1966 p 1057-1064
(NASA-TT-F-14443) Avail: NTIS HC #3.00 CSCL 20M

The equation on the radiation transfer in a nonhomogeneous medium is derived from the continuity equation for the radiation energy density in the space coordinates and in the directions of group velocity. The Oster theory of transfer in nonhomogeneous medium is shown to be inaccurate. Author

N72-32948*# Scientific Translation Service, Santa Barbara, Calif.
DIFFERENTIAL EQUATIONS OF THE PROBLEM OF THERMAL DIFFUSION IN A SOLID DEFORMED ISOTROPIC BODY
Ya. S. Rotstrigach Washington NASA Oct. 1972 6 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. RSR (Kiev), no. 2, 1961 p 169-172
(Contract NASw-2035)
(NASA-TT-F-14572) Avail: NTIS HC $3.00 CSCL 20M

A system of linear differential equations is given, found by the methods of the thermodynamics of irreversible processes, describing the connection between the processes of deformation, thermal conductivity and diffusion in a solid isotropic two-phase solution. For the case when the effect of the mechanical oscillations is negligibly small, the general solution of the system is proposed in Pankovich-Neiber form. In the limiting case, when the effect of diffusion is eliminated from the consideration, the given system of equations is transformed into the well-known equations of thermoelasticity, taking the thermoelastic effect into consideration. Author

N72-32949*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPARISON OF HEAT TRANSFER CHARACTERISTICS OF THREE COOLING CONFIGURATIONS FOR AIR-COOLED TURBINE VANES TESTED IN A TURBOJET ENGINE
Frederick C. Yeh, Herbert J. Gladden, and James W. Gauntner Washington Oct. 1972 37 p refs
(NASA-TM-X-2580; E-6948) Avail: NTIS HC $3.00 CSCL 20M

A comparison was made of the heat transfer characteristics of three air cooled vanes. The vanes incorporated cooling schemes such as impingement cooling, film cooling, and convection cooling with and without extended surfaces. A redesign study was made for two vanes to improve the cooling effectiveness. An average impingement heat transfer coefficient was calculated on the bases of experimentally determined temperatures at the leading edge and a one dimensional heat transfer calculation. This heat transfer coefficient was compared with existing impingement heat transfer correlations. Author

N72-32950*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AVERAGE HEAT-TRANSFER CHARACTERISTICS OF A ROW OF CIRCULAR AIR JETS IMPINGING ON A CONCAVE SURFACE
John N. B. Livingood and James W. Gauntner Washington Oct. 1972 24 p refs
(NASA-TM-X-2657; E-7015) Avail: NTIS HC $3.00 CSCL 20M

A study of the average heat-transfer characteristics of air jets impinging on the concave side of a right-circular semicylinder is reported. Results from existing correlating are compared with each other and with experimental heat-transfer data for a row of circular jets. Two correlations available in the literature are recommended for use in designing cooled turbine vanes and blades. Author

N72-32951# Institute of Nuclear Research, Warsaw (Poland).
THERMODYNAMIC FUNCTIONS OF NON-THERMAL RADIATING SYSTEMS
Szymon Suckewer 1971 10 p refs
(INR-P-1367) Avail: AEC Depository Libraries

A pseudothermodynamic model of a system which, due to radiation leaving the system, is not in a thermodynamic equilibrium, is discussed. Thermodynamic properties of this model are pointed out. Author (NSA)

N72-32952# Radio Corp. of America, Lancaster, Pa. Industrial Tube Div.
DEVELOPMENT OF A HIGH VOLTAGE HEAT PIPE THERMIONIC MODULE Final Technical Report, 1 Oct. 1969 - 30 Jun. 1971
R. W. Longsderff Jul. 1971 62 p
(Contract AT(30-1)-4161)
(WASH-1199) Avail: NTIS

Research directed toward the design, fabrication, and testing of a 5V 10-diode heat pipe thermionic module is reported. It was found that the development of the internally series-connected module concept appears to be a basis for obtaining an output voltage of approximately 28 volts in advanced modules. Development of the key module components, such as the integral emitter/collector tri-layer assembly and arc suppression coating, showed the feasibility of the concept. The development of a lithium heat pipe for distribution of the input thermal power was also shown. The concept design should be modified to gain further thermal stress relief in the collector-to-collector interconnection ring joint to permit E-B welding without risking the integrity of the arc suppression coating. The design might also be modified to permit a stepped approach of emitter to heat pipe assembly in order to eliminate the risk of molybdenum-to-molybdenum seizure during assembly. NSA

N72-32953# Avco Corp., Lowell, Mass. Systems Div.
EXPLORATORY DEVELOPMENT TO STUDY GRAPHITE VAPORIZATION KINETICS AND THERMODYNAMICS USING THE MODULATED BEAM MASS SPECTROMETER Quarterly Report, 1 May - 31 Jul. 1971
Warren C. Steele and Frederick N. Bourgelas 31 Jul. 1971 22 p refs
(Contract F33615-71-C-1509)
(AD-744493; AVSD-0022-72-CR; QR-1) Avail: NTIS CSCL 07/4

Progress is reported in a program of mass spectrometric studies of graphite vaporization kinetics. Emphasis has been placed on measurement of reflection coefficients for the three major constituents of carbon vapor impinging on a heated graphite surface. Use of modulation techniques has been employed to detect a reflected beam interacting with the graphite surface to T(s) < or = 2600 K. Development of a

vapor source for an isotopically enriched carbon beam using graphite powder is described. Author (GRA)

N72-32897* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASTRAN THERMAL ANALYZER: A GENERAL PURPOSE FINITE ELEMENT HEAT TRANSFER COMPUTER PROGRAM
Hwa-Ping Lee and James B. Mason *In its* NASTRAN: Users' Experiences Sep. 1972 p 443-454 refs (For availability see N72-32867 23-32)
CSCL 20M

34 GENERAL

Includes information of a broad nature related to industrial applications and technology, and to basic research; defense aspects; information retrieval; management; law and related legal matters; and legislative hearings and documents.

N72-32954*# Syracuse Univ., N.Y.
PROJECT MANAGEMENT IN THE APOLLO PROGRAM: AN INTERDISCIPLINARY STUDY Final Report
Eugene E. Drucker, William S. Pooler, David L. Wilemon, and Bernard D. Wood Jan. 1972 173 p refs
(Grant NGL-33-022-090)
(NASA-CR-126941; Rept-6223-R) Avail: NTIS HC $10.75 CSCL 05A

Findings concerning project management in the NASA Apollo program are presented. The Apollo program in the context of the total NASA organization is examined along with the nature of project management and the manner in which project managers functioned in the Apollo program. The utilization of the in-house technical competence in the support of the Apollo program, and the formal and informal relationships between Apollo managers and the contractors are discussed. F.O.S.

N72-32955*# Smithsonian Institution, Washington, D.C. National Air and Space Museum.
FEASIBILITY STUDY OF AN AEROSPACE MUSEUM IN THE WESTERN UNITED STATES. VOLUME 1: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS Final Report
31 Jul. 1972 31 p
(Contract NASw-2215)
(NASA-CR-127333) Avail: NTIS HC $3.75 CSCL 05D

A survey of existing aerospace museums in the U.S. and a study of the feasibility of establishing an aerospace museum in the western U.S. are summarized. It is recommended that prime consideration be given to carefully considered support of development of existing aerospace exhibits rather than establishment of a new major museum. In the event that the decision is made to pursue the establishment of a new museum, Los Angeles is considered to be the most favorable location. In particular, because of the large attendance and existing building space at the California Museum of Science and Industry at Los Angeles, it is recommended that this museum's proposal be given first consideration. Supporting surveys of aerospace museums, funding, and related studies are also summarized. N.E.N.

N72-32956*# Smithsonian Institution, Washington, D.C. National Air and Space Museum.
FEASIBILITY STUDY OF AN AEROSPACE MUSEUM IN THE WESTERN UNITED STATES. VOLUME 2: DOCUMENTATION Final Report
31 Jul. 1972 82 p refs
(Contract NASw-2215)
(NASA-CR-127334) Avail: NTIS HC $6.25 CSCL 05D

Papers supporting the study on establishing an aerospace museum in the western United States are presented. These cover the following areas of investigation: (1) The potential locations in the west were analyzed, and the most logical locations for museum development are Los Angeles, San Francisco, San Diego, Seattle, and Phoenix/Tucson. (2) The 26 museums and other organizations with significant public displays of aeronautics, astronautics, or astronomy are listed. (3) The activities and functions of museums, and their obligations to the user-visitor are discussed. (4) The sources for construction and improvements, operations, and acquisitions are described. (5) General curatorial responsibilites in preserving and exhibiting aerospace specimens and artifacts are also discussed. N.E.N.

N72-32957*# Denver Univ., Colo. Dept. of Mechanical Sciences and Environmental Engineering.
PROGRAM FOR THE EXPLOITATION OF UNUSED NASA PATENTS Final Annual Report, 1 Aug. 1971 - 31 Aug. 1972
Richard J. Fay 31 Aug. 1972 116 p refs
(Grant NGL-06-004-078)
(NASA-CR-128294; DRI-2604; AR-4) Avail: NTIS HC $8.00 CSCL 05A

The program to exploit unused NASA patents through the use of a multidisciplinary approach involving faculty, students, and research staff is reported. NASA patents were screened for their applicability outside the space program, specific applications were identified, and the technical and commercial feasibility of these applications was established. Also application of this technology by governmental agencies outside the space program was sought. The program was specifically interested in energy absorbing devices such as those developed for lunar soft landings. These energy absorbing devices absorb large amounts of mechanical energy but are, in general, not reusable. Some of these devices can also operate as structural elements until their structural load capacity is exceeded and they become activated as energy absorbers. The capability of these devices to operate as structural elements and as energy absorbing devices makes them candidates for many applications in the fields of transportation and materials handling safety where accidents take a large toll in human injury and property damage. Author

N72-32958# National Aeronautical Lab., Bangalore (India).
[AERONAUTICAL RESEARCH AND TECHNOLOGY] Annual Report, 1970 - 1971
1971 69 p
Avail: NTIS HC $5.50

The research activities for the various divisions of the National Aeronautical Laboratory are reported for 1970-1971. The research for the following areas is included: aerodynamics, propulsion, structural sciences, materials science, electronics, instrumentation, and mathematical sciences. F.O.S.

N72-32959# Committee on Space Research (COSPAR), Paris (France).
COSPAR INFORMATION BULLETIN NO. 62
A. C. Stickland, ed. Jun. 1972 57 p refs Partly in ENGLISH; partly in FRENCH
Avail: NTIS

Information on future meetings, including an international conference on launching bases, and other meetings of interest to COSPAR, is presented. International cooperative programs, the International Information Bureau on Astronomical Ephemerides, 1971 French space activities, determination of radius vectors of an earth satellite, a survey of satellites and space probes, space radiobiology and radiation safety, and the special meeting of the working group on applications of space techniques to meteorology and earth survey are also discussed. K.P.D.

N72-32960# Committee on Space Research (COSPAR), Paris (France).
COSPAR INFORMATION BULLETIN NO. 61

A. C. Stickland, ed. Mar. 1972 63 p refs Partly in ENGLISH; partly in FRENCH
Avail: NTIS HC $5.25

Future meetings of the International Astronautical Congress, a symposium on atmospheric ozone, and other meetings of interest to COSPAR are reported. International cooperative programs are considered, as well as resolutions adopted by the UN General Assembly. Proposed standards for distribution and documentation of lunar laser ranging data are presented. K.P.D.

N72-32961# Committee on Aeronautical and Space Sciences (U. S. Senate).
SPACE AGREEMENTS WITH THE SOVIET UNION
Washington GPO 1972 100 p refs Hearing before Comm. on Aeron. and Space Sci. 92d Congr., 2d Sess., 23 Jun. 1972
Avail: Comm. on Aeron. and Space Sci.

The text of an agreement between the Soviet Union and the United States on the peaceful use of space is presented before the Committee on Aeronautical and Space Sciences. The agreement covers space meteorology, the natural environment, exploration of near earth space, the moon, and the planets, and space biology and medicine. E.H.W.

N72-32962# National Science Foundation, Washington, D.C. Federal Academic Science Studies Group.
FEDERAL SUPPORT TO UNIVERSITIES AND COLLEGES REACHES $3.5 BILLION IN FISCAL YEAR 1971
22 Sep. 1972 4 p ref
(NSF-72-316) Avail: NTIS HC $3.00

Federal support during FY 1971 is summarized according to contributing agency, university, and field of science, and is compared with federal support during FY 1970. Total Federal funds increased by 8%; science and R and D activities were each up 7%. The life sciences accounted for 48% of R and D funds and 53% for training grants and fellowships. The Department of Health, Education, and Welfare continued to contribute the largest share of the funds, and increased the amount by $212 million. The 100 colleges receiving the largest amounts, 69% of the total funds, are listed. N.E.N.

N72-32963# Committee on Armed Services (U. S. Senate).
FISCAL YEAR 1973 AUTHORIZATION FOR MILITARY PROCUREMENT, RESEARCH AND DEVELOPMENT, CONSTRUCTION AUTHORIZATION FOR THE SAFEGUARD ABM, AND ACTIVE DUTY AND SELECTED RESERVE STRENGTHS. ADDENDUM 1: AMENDED MILITARY AUTHORIZATION REQUEST RELATED TO STRATEGIC ARMS LIMITATION AGREEMENT
Washington GPO 1972 195 p refs Hearings on S. 3108 before Comm. on Armed Serv., 92d Congr. 2d Sess., 6, 22 Jun. and 21, 26 Jul. 1972
Avail: Comm. on Armed Serv.

Congressional hearings before the Committee on Armed Services of the United States Senate during the Ninety-second Congress are presented. The purpose of the hearings is to authorize appropriations during the fiscal year 1973 for procurement of weapon systems, research and development, construction of antimissile defense, and to prescribe authorized strengths for active and reserve military components. The hearings consist primarily of testimony by selected Department of Defense witnesses. Author

N72-32964# Committee on Science and Astronautics (U. S. House).
REAL ESTATE DISPOSAL, NASA
Washington GPO 1972 67 p refs Hearing before Comm. on Sci. and Astronaut., 92d Congr., 2d Sess., 8 Aug. 1972
Avail: Subcom. on NASA Oversight

The hearings before the House Subcommittee on NASA oversight are presented on NASA policies and procedures concerning real estate management and disposal. The need of enacting legislative provision requiring formal reports to the Congress by NASA on real estate disposal action is considered. Testimony is presented on NASA and NASA-related GSA policies, emphasizing the excess land declarations at Lewis Research Center, Langley Research Center, and Wallops Island. N.E.N.

N72-32965# Royal Aircraft Establishment, Farnborough (England).
CONTRIBUTION TO JUDGING THE RIDING COMFORT OF RAILWAY WAGONS
E. Sperling Jul. 1972 14 p refs Transl. into ENGLISH from Glasers Ann. (West Berlin), Oct. 1956 p 314-317
(RAE-Lib-Trans-1630; BR-29692) Avail: NTIS HC $3.00

Increase in the riding comfort of passenger railway carriages, an improvement in air conditioning and illumination, and reduction in noise and vibration are discussed. Tests in railway car construction have two aims: (1) to determine riding comfort as observed by the passengers, and (2) to advise the constructors on improvements. The subjective estimation of riding noise and vibration is considered. Author

N72-32966# Department of Transportation, Washington, D.C. Office of Systems Analysis and Information.
NATIONAL TRANSPORTATION STATISTICS Summary Report
Frances T. Boleger, comp. (MIT), Pamela Werner, comp. (MIT), and Gill V. Hicks, comp. 1 Nov. 1971 88 p refs
Avail: NTIS HC $6.50

A compendium of national transportation statistics is presented and consists of summaries in the form of tree displays, modal profiles, and transportation trends. Indices to the data base covering the years 1958 through 1970 are included. It is felt that with the time series data, the user can identify trends and undertake regression analysis. N.E.N

N72-32967# Committee on Science and Astronautics (U. S. House).
FOR THE BENEFIT OF ALL MANKIND The Practical Returns from Space Investment
George P. Miller Washington GPO Oct. 1972 83 p refs Presented by the Comm. on Sci. and Astronaut. to the Comm. of the Whole House on the State of the Union, 92d Congr., 2d Sess., 27 Sep. 1972
(H-Rept-92-1452) Avail: US Capitol, House Document Room

An updated and expanded report on the subject of the spinoff dividends accruing from space exploration is presented. Statements on the broad values of the space program by persons in responsible positions and by the press are given. Tangible benefits are described in the following areas: communications, weather forecasting, business and industry, management, agriculture, the environment, aeronautics, education, medicine, home and marketplace, municipal and urban affairs, and benefits abroad. Expected benefits in the future are also mentioned. N.E.N.

N72-32968# National Bureau of Standards, Washington, D.C.
THE INTERNATIONAL SYSTEM OF UNITS (SI)
Chester H. Page, ed. and Paul Vigoureux, ed. Apr. 1972 47 p refs Transl. into ENGLISH of Intern. Bur. of Weights and Meas. publ. "Le Systeme International d'Unites" Paris, OFFILIB, 1972 Supersedes NBS-SP-330, Jan. 1971; see N71-18489 Prepared jointly with Natl. Phys. Lab.
(NBS-SP-330-1972; LC-73-608985; NBS-SP-330) Avail: SOD $0.30 as C-13.10:330/2

The SI units are defined and described along with other units outside the SI and prefixes for multiples and submultiples. The basic units are those of length (metre), mass (kilogram), time (second, based on cesium-133 atomic standard), electric current (ampere), thermodynamic temperature (degree Kelvin), amount of substance (mole), and luminous intensity (candela). Other units are derived units, such as area and velocity, and supplementary units, such as geometric angles and angular velocity. Definitions

are also given for photometric units, mechanical units, and electric units. Refinements in definitions, symbols, and recommendations on units to avoid (such as CGS units) are included. N.E.N.

N72-32969# Department of Transportation, Washington, D.C.
A STATEMENT ON NATIONAL TRANSPORTATION POLICY
John Volpe 8 Sep. 1971 67 p
Avail: NTIS HC $5.50

The status of transportation in America is considered, including the federal, state, and local roles in transportation. Problems of transportation (both systematic and systemic), existing policies and alternative approaches, transportation objectives, and new directions in transportation policy are also discussed. K.P.D.

N72-32970# Office of Naval Research, Arlington, Va.
NAVAL RESEARCH REVIEWS, JUNE - JULY 1972
William J. Lescure, ed. Jul. 1972 37 p refs
Avail: SOD $0.20

Papers are presented on navigation satellites, oil pollution, and dolphin communication, and notes on other projects are included. The role of time and frequency is discussed in the areas of the operational Navy Navigation Satellite System, the Timation satellite and advanced satellites. The trend in military navigation satellites is toward the use of onboard clocks to allow time-delay to be measured directly and passively by users. Experiments on marine microorganisms and the biodegradation of crude oil are described. Work on dolphin acoustics centered on the whistles which were found to be largely stereotyped for the individual animal. The research notes are on mid-ocean dynamics, acquisition of a new patrol aircraft, a mathmatical model used in studying schistosomiasis, the IR and D Data Bank, heavy ion source in the magnetospheric auroral zone, ocean floor photography, deep drilling with the Alvin, and the beginning of the George Melville oceanographic expedition. N.E.N.

N72-32971# Office of Naval Research, Arlington, Va.
NAVAL RESEARCH REVIEWS, MAY 1972
William J. Lescure, ed. May 1972 33 p refs
Avail: SOD $0.20

Three analytical models for manpower decisions are discussed; a career management model, a multilevel model with an integrated systems approach, and dynamic organization design. Other research topics include the invention of an instrument to measure radiation, prevention and cure of cavitation erosion, cesium 129 as a radioisotope for heart research, the lunar surface ultraviolet camera/spectrograph used on the Apollo 16, the 1972 Arctic ice dynamics joint experiment at Barrow, Alaska; a technique for measuring pollutants with X-rays; a water/oil-resistant coating; and an inflatable vacuum seal for eccentric tubes. K.P.D.

N72-32972# Carleton Univ., Ottawa (Ontario). Div. of Solid Mechanics and Structural Engineering.
INTERCITY PASSENGER TRANSPORT: A SYSTEM DESIGN OPTIMIZATION MODEL
Salah G. Hamzawi Jun. 1972 135 p refs
(TR-72-1) Avail: NTIS HC $8.75

An optimization model for designing intercity passenger transport systems in situations where the system demand is sensitive to its supply is developed. The model comprises a set of relationships that estimate the system travel demand (expressed as a fraction of a given total common carrier traffic), the system performance measures, and the system costs in terms of its basic design variables. The basic design variables are the travel speed and the vehicle size, and their optimal values are obtained by minimizing the total system cost per passenger-mile traveled. Other system design variables are accordingly analyzed in terms of these two basic design variables. The model is applied to the design of a STOL air link between Toronto and Montreal. The results are believed to be reasonable and appear to be consistent with the real world practice. The model is applicable to any public transport technology. Author

N72-32973# National Aerospace Lab., Amsterdam (Netherlands).
NLR REPORT FOR THE YEAR 1971 [VERSLAG OVER HET JAAR 1971 STICHTING NATIONAAL LUCHT-EN RUIMTEVAARTLABORATORIUM]
1971 108 p refs In DUTCH; ENGLISH summaries
Avail: NTIS HC $7.50

Research projects of the National Aerospace Laboratory of the Netherlands are presented. The subjects discussed are: (1) aircraft noise problems, (2) calculation of subsonic, steady flow over aircraft configurations, (3) aircraft development, (4) scale effects in wind tunnels, (5) strength and stiffness in structures, (6) temperature effects on the properties of materials, (7) air traffic control, and (8) spacecraft development. Author

N72-32974*# Wisconsin Univ., Madison. Space Science and Engineering Center.
MULTIDISCIPLINARY STUDIES OF THE SOCIAL, ECONOMIC AND POLITICAL IMPACT RESULTING FROM RECENT ADVANCES IN SATELLITE METEOROLOGY, VOLUME 1 Interim Report
Jun. 1971 476 p refs
(Grant NGL-50-002-114)
(NASA-CR-127335) Avail: NTIS HC $26.00 CSCL 05K

The multidisciplinary studies explore and evaluate the impact of the meteorological satellite and the concomitant impact of the data derived from it on various user groups. As expected, the primary impact related to those who would use satellite data for weather prediction and related purposes. A secondary impact was in the area of international concerns where GARP and other international meteorological activities were affected and international law was developed. A tertiary impact was exemplified by satellite photographs utilized in advertisements and related materials. The case studies, supporting studies, and independent studies all emphasize the potential of the meteorological satellite. Author

N72-32975*# Wisconsin Univ., Madison. Space Science and Engineering Center.
MULTIDISCIPLINARY STUDIES OF THE SOCIAL, ECONOMIC AND POLITICAL IMPACT RESULTING FROM RECENT ADVANCES IN SATELLITE METEOROLOGY, VOLUME 2 Interim Report
Jun. 1971 449 p refs
(Grant NGL-50-002-114)
(NASA-CR-127336) Avail: NTIS HC $24.50 CSCL 05K
For abstract, see N72-32974.

N72-32976# RAND Corp., Santa Monica, Calif.
SYSTEMS ANALYSIS: A TOOL FOR CHOICE
E. S. Quade Jul. 1972 14 p refs Presented at the RAND-Nomura Res. Inst. Seminar on Social Probl. and the Systems Approach, Kanagawa, Japan, 2 Jun. 1972
(P-4860) Avail: NTIS HC $3.00

Systems analysis is described, and its history is briefly reviewed. Systems analysis is compared with other approaches for decision making, and its characteristics and procedures are considered. The values obtained from the systems approach are outlined. Author

N72-32977# Naval Research Lab., Washington, D.C.
REPORT OF NRL PROGRESS, AUGUST 1972
William M. Leak, ed. and Daniel R. Nelson, ed. Aug. 1972 48 p refs
Avail: NTIS HC $4.50

Surveillance is maintained over the mechanical properties of the steel reactor components to monitor any changes in properties wrought by the nuclear radiation. A technique was

developed to permit the most reliable and realistic estimates possible of the future steel mechanical property condition. The technique is based upon use of computer-derived, analytical, damage-functions comprised of a series of cross sections that accurately reflect the damaging potential of all the neutrons that cause the radiation-induced property changes. A criterion was established for the accounting of neutrons in analyses of radiation embrittlement of pressure vessel steels. Progress reports are also presented on research in acoustics, chemistry, communications sciences, metallurgy, ocean technology, plasma physics, radar, and solid state physics. Author

N72-32978*# Scientific Translation Service, Santa Barbara, Calif.
THE SPACE ERA: SOCIETY AND NATURE
V. I. Sevastianov and A. D. Ursul Washington NASA Sep. 1972 78 p refs Transl. into ENGLISH of "Era Kosmosa: Obshchestvo i Priroda" Moscow, Zhaniye Press, 1972 64 p
(Contract NASw-2035)
(NASA-TT-F-14517) Avail: NTIS HC $6.00 CSCL 05K

The effect of astronautics on the development of fundamental and applied sciences, technology, and production, is discussed with respect to the interaction between society and nature. Not only the basic directions in the conquest of outer space are explained, but also an original attempt is made to classify and formalize them, using a systems structure approach. Author

N72-32979*# Scientific Translation Service, Santa Barbara, Calif.
THE PLANET'S FIRST COSMONAUT
G. S. Titov Washington NASA Oct. 1972 38 p refs Transl. into ENGLISH of "Pervyy Kosmonavt Planety" Moscow, Znaniye Press, 19-71 32 p
(Contract NASw-2035)
(NASA-TT-F-14606) Avail: NTIS HC $4.00 CSCL 05D

The human interest aspects of the background and preparations of Yuriy Alekseyevich Gagarin for the first manned flight in space are presented. Photographs of aviator-cosmonaut Gagarin are included. F.O.S.

N72-32980# Kirschner (E. J.) and Associates, Washington, D.C.
INTERMODAL TRANSPORTATION CAREERS: A GUIDE FOR DEVELOPMENT OF EDUCATIONAL PROGRAMS Final Report
DOT Feb. 1972 145 p Sponsored in part by DOT
(Contract OE-C-0-71-4433(357))
Avail: NTIS HC $9.25

The educational needs and criteria in the overall transportation systems field are described. The transportation program guidelines offer the educational community an opportunity to help renew or develop careers in the changing transportation systems professions, and for career mobility to those already employed in transportation. The curricular guidelines are interdisciplinary and multidisciplinary, embracing the transportation environment of development, operation, and management. The suggested programs are divided into three levels. Each core program is flexible enough to construct instructional units or modqles of educational elements of specific skills, knowledge, and concepts, while at the same time oriented toward career or job preparation. The core guidelines are applicable to secondary, community college, and technical school levels. Ten select occupational fields within this general career classification are covered. Author

N72-32981# Federal Aviation Administration, Washington, D.C. Flight Standards Service.
FAA VIEWS ON NONDESTRUCTIVE TESTING
Jaime D. Serra [1972] 17 p refs Presented at Air Transport Assoc. Nondestructive Testing Subcomm. Meeting, Denver, 20-22 Sep. 1972
Avail: NTIS HC $3.00

The role of nondestructive testing in the improvement of aircraft operations from a safety and economic aspect is discussed. The application of nondestructive tests in various airworthiness areas is described. The establishment of schools and training courses for qualifying personnel in nondestructive testing techniques is presented. The various problem areas and efforts to overcome recognized deficiencies are analyzed. Author

N72-32982# Department of Transportation, Washington, D.C.
THE 1972 NATIONAL TRANSPORTATION REPORT: PRESENT STATUS, FUTURE ALTERNATIVES
Jul. 1972 28 p
Avail: NTIS HC $3.50

A comprehensive picture and future outlook of transportation, estimates of investment needs and program priorities, analyses of selected issues in urban and intercity transportation, and guidelines for future action by Federal, State, and local governments, as well as the private sector, are presented. The long range planning process which underlies the report is designed to support statutory planning efforts in specific modes of transporation. Data are presented to show increases in traffic and predictions of future requirements. Author

N72-32983# World Airways, Inc., Oakland, Calif.
CHARTERS, THE NEW MODE: SETTING A NEW COURSE FOR INTERNATIONAL AIR TRANSPORTATION
Jerrold Scoutt, Jr. [1972] 48 p refs Presented at 1st World Congr. on Air Transportation and Tourism, Madrid, 17-21 Apr. 1972
Avail: NTIS HC $4.50

The increased utilization of charter airline service as a method for enlarging the overall air transportation capability is discussed. It is recommended that a five year trial period be instituted in which international charter services would be given recognition through a series of bilateral regimes. Each regime would be based on the traffic flows, both scheduled and charter, between the signatory parties but the emphasis would always be on expanding the charter concept while attempting to reach a reasonable distinction between scheduled and charter services. Each pair of bilateral partners would meet yearly to analyze the results and agree to further expansion. Author

N72-32984# World Airways, Inc., Oakland, Calif.
MINIMUM TRANSPORTATION REGULATION MAXIMIZES TOURISM'S CONTRIBUTION TO ECONOMIC GROWTH
Howell M. Estes, Jr. [1972] 17 p refs Presented at 1st World Congr. on Air Transp. and Tourism, Madrid, 17-21 Apr., 1972
Avail: NTIS HC $3.00

The effect of minimum transportation regulation on the contribution of tourism to economic growth is discussed. It is concluded that tourism has assumed major stature as a world economic force and that the future of airlines is closely tied to the development of tourism. It is also concluded that tourism can achieve its full growth potential only in a policy framework that permits the highest level of freedom to all elements in the tourism picture. Author

N72-32985# Department of Transportation, Washington, D.C.
THE IMPLEMENTATION OF THE STATEMENT ON NATIONAL TRANSPORTATION POLICY Annual Report
May 1972 120 p refs
(AR-1) Avail: NTIS HC $8.00

A succinct restatement, except for minor modifications, is given of the broad scheme of transportation policy as presented in the Statement on National Transportation Policy. Those departmental actions of the past year which, as either new initiatives or measures receiving continuing emphasis, served to further the policies set forth in the statement are outlined. Individual reports from the operating administrations of the department are appended, as well as reports on certain other departmental programs of an operational nature. These accounts, in contrast to the material in the basic report, set forth in quite

detailed terms specific departmental activities which aid in the implementation of various facets of transportation policy. Author

N72-32986# Federal Aviation Administration, Washington, D.C. Aviation Forecast Div.

LARGE AND MEDIUM HUB: AVIATION ACTIVITY FORECAST AIR CARRIER AIRPORTS, 1967 - 1983

Apr. 1972 58 p refs

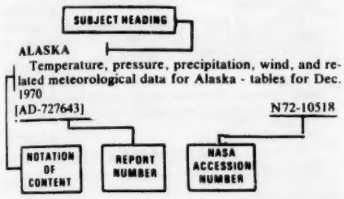
Avail: NTIS HC $5.00

This report summarizes certain forecast data condensed from the Terminal Area Forecast report pertaining to those airports which account for 90 percent of the air carrier market in the United States. Included in this report are 69 hub areas with 89 air carrier airports. The focus upon the air carrier segment of aviation activity naturally dictates a concentration upon the large and medium hubs - a designation premised upon relative air carrier market shares. These hubs have been taken along with five additional cities which border upon the medium hub category and San Juan and summaries have been prepared for aviation activity forecasts along with pertinent economic data.

Author

SUBJECT INDEX

TYPICAL SUBJECT INDEX LISTING



The subject heading is a key to the subject content of the document. The Notation of Content (NOC), rather than the title of the document, is used to provide a more exact description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The NOC's are arranged under each subject heading in ascending accession number order.

A

ABLATION
Sublimation ablation for hypersonic heat shielding device
[NASA-TT-F-14529] N72-32936
ABRASION
Use of profilograph recordings and microphotographs to determine single traces of impact and product of wear in abrasive erosion
[NLL-RTS-7374] N72-32488
Handbook on tests for abrasive wear in various materials and systems
[AD-744182] N72-32513
ABSORPTION
Reflection, transmission, and absorption coefficients for plane wave incident on plasma layer
[EUR-CEA-FC-627] N72-32703
ABSORPTION CROSS SECTIONS
Atomic oxygen absorption cell system applied to absorption cross sections
[AD-744097] N72-32168
ABSORPTION SPECTRA
Absorption band analysis of ERTS-1 data for discrimination of iron-rich zones
[E72-10111] N72-32363
ABSORPTIVITY
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550
Quantitative spectra of atmospheric ice and absorptivity coefficients for ice and liquid water
[AD-743445] N72-32631
ACCELERATION STRESSES [PHYSIOLOGY]
Effects of increased gravity on bat echolocating mechanism
[JPRS-56073] N72-32084
ACCELEROMETERS
Design and qualification tests of accelerometers for Misty North event
[UCRL-73654] N72-32478
ACOUSTIC DELAY LINES
Techniques for implementing phase coded filters with surface wave delay lines
[AD-744474] N72-32253
ACOUSTIC EXCITATION
Analysis of acoustic wave excitation in flame seeded with alkaline metal
[NASA-TT-F-14594] N72-32660
Method of estimating rms stress in stiffened skin panels subjected to random acoustic loading
[ESDU-72005] N72-32862
ACOUSTIC MEASUREMENTS
Analysis of aircraft noise generation and optimization of flight paths to minimize effects of aircraft noise during takeoff
[NASA-TT-F-14468] N72-32042
Numerical analysis of total sound pressure field emitted by stationary rotating jet and sound field from same jet in motion observed at fixed point on ground
[NASA-TT-F-14489] N72-32047
Nondestructive, structure borne acoustics technique for checkout, monitoring, fault diagnosis, and readiness assessment of mechanical devices for future space missions
[NASA-CR-128171] N72-32491
Infrasonic wave detection applied to seismology, geophysics, underwater communication, storm forecasting, agriculture, medicine, and industrial nondestructive tests
[AD-743828] N72-32663
ACOUSTIC PROPERTIES
Numerical analysis of total sound pressure field emitted by stationary rotating jet and sound field from same jet in motion observed at fixed point on ground
[NASA-TT-F-14489] N72-32047
Mathematical models for analyzing structural-acoustic interactions in metal-ceramic piezoelectric transducers
[AD-743985] N72-32236
ACOUSTIC SCATTERING
Surface deformation and acoustic wave scattering by spherical inclusion in isotropically elastic solid
[RE-440] N72-32655
ACOUSTICS
Architectural acoustics, and physical and technological factors in acoustic field modeling
[NASA-TT-F-14466] N72-32658
ACRYLONITRILES
Inhibition of thermal discoloration of polyacrylonitrile between 120 and 200 C by maleic acid and maleic imide
[RAE-LIB-TRANS-1593-[A]-PT-1] N72-32146
Inhibition mechanism of thermal discoloration of polyacrylonitrile by maleic imide supported by solubility studies
[RAE-LIB-TRANS-1593-[B]-PT-2] N72-32147
ACTIVATION [BIOLOGY]
PH dependent inhibition and reactivation of angiotensin 2 A and angiotensin 2 H and EDTA angiotensinases inhibition in amide cleaving enzymes of human blood plasma
[NASA-TT-F-14457] N72-32118
ADAPTIVE CONTROL
Development of algorithm for solving problem of controlling time-varying linear avionic system with random parameters based on adaptive dual control strategy - Part 1
[AD-744115] N72-32064
Development of theory for designing optimal inputs to identify parameters in linear dynamic systems and application to avionics installations - Part 2
[AD-744116] N72-32065
Development of controller design procedure for aircraft throughout entire flight envelope based on quadratic optimal control technology
[AD-744491] N72-32068
Adaptive techniques for parameter identification and control of linear, nonlinear, and time varying plants
[AD-744344] N72-32260
ADRENAL METABOLISM
Alkaline phosphate activity of adrenocortical cells in tailed newts
[NASA-TT-F-14577] N72-32104
AERIAL PHOTOGRAPHY
Infrared aerial photography for hydrogeological analysis
[NASA-TT-F-14461] N72-32406
Aerial photogrammetric surveys of sea otter abundance and distribution at Amchitka Island, Alaska
[BMI-171-135] N72-32422
AERIAL RECONNAISSANCE
Computer-aided evaluation of reconnaissance image compression schemes, using on-line interactive facility
[AD-743860] N72-32191
Digital processing of IR line-scan video signals collected during 24 hour period of aerial reconnaissance
[AD-744332] N72-32485
AEROBIOLOGY
Water soluble filter for trapping airborne microorganisms
[NASA-TT-F-14440] N72-32111
AERODYNAMIC BRAKES
Aerodynamic characteristics and pressure distribution of disk-gap-band parachute deployed behind expandable blunted-cone simulated spacecraft
[NASA-TN-D-6910] N72-32855
AERODYNAMIC CHARACTERISTICS
Development of procedures for calculating pressure distribution on airfoil in sonic stream
[ESDU-69013] N72-31989
Numerical representations of lift-curve slope and aerodynamic center position of wings in inviscid, subsonic flow
[ESDU-70011] N72-31991
Aerodynamic problems of designing optimum hypersonic vehicles
[AGARD-LS-42-VOL-1] N72-31994
Waverider prediction of hypersonic behavior of wing planforms N72-31997
Aerodynamic characteristics of lifting surfaces
[JPRS-57100] N72-32005
Calculating aerodynamic characteristics of lifting systems composed of rectangular wings arranged one behind other N72-32007
Analysis of spanwise distribution leading edge tangential suction forces on thin sixty degree delta wing obtained in low speed wind tunnel
[KTH-AERO-TN-58] N72-32011
Wind tunnel tests to determine path of vortex moving from each rotor blade tip of helicopter rotor to establish effect on aerodynamic forces and pressure distribution
[NASA-TT-F-14462] N72-32012
Analysis of gust loads on transport aircraft under various flight conditions
[ESDU-69023-AMEND-B] N72-32015
Aerodynamic characteristics of CL-84 tilt wing, V/STOL aircraft and comparison with handling qualities criteria documents N72-32023
Analysis of aerodynamic characteristics of VJ-101C and DO 31E V/STOL aircraft and comparison with criteria contained in handling requirements documents N72-32024
Application of simulation and analysis techniques for establishing flying qualities criteria for piloted aircraft N72-32026
Development and application of pilot rating to determining performance and handling criteria of aircraft N72-32028
Properties of atmospheric turbulence at low altitudes and effect on aircraft during landing approach and takeoff N72-32030
Aerodynamic characteristics and performance of Russian M-4 supersonic long range aircraft
[AD-744159] N72-32051
Development of controller design procedure for aircraft throughout entire flight envelope based on quadratic optimal control technology
[AD-744491] N72-32068
Numerical approximation of wave drag characteristics of rectangular planform fairings at zero degree incidence in supersonic flow
[ESDU-71018] N72-32289
Numerical analysis of flow distribution about nonaxisymmetric bodies at subsonic and supersonic speeds
[NASA-TT-F-14547] N72-32302
Computer programs for analyzing axial compressor aerodynamic test data
[AD-744503] N72-32756
Tests to determine acoustic and aerodynamic performance of two choked flow inlets under static conditions
[NASA-TM-X-2629] N72-32765
Aerodynamic characteristics and pressure distribution of disk-gap-band parachute deployed behind expandable blunted-cone simulated spacecraft
[NASA-TN-D-6910] N72-32855

AERODYNAMIC COEFFICIENTS
Numerical representations of lift-curve slope and aerodynamic center position of wings in inviscid, subsonic flow
[ESDU-70011] N72-31991
Effect of proximity of earth surface to aerodynamic coefficients
N72-32006
Calculating aerodynamic characteristics of lifting systems composed of rectangular wings arranged one behind other
N72-32007
Nonlinear theory of lifting surfaces applied to problem of forces acting on rectangular wing in stream of incompressible fluid
N72-32008

AERODYNAMIC CONFIGURATIONS
Optimization methods for determining aerodynamic shapes of hypersonic transport vehicles
N72-31996
Analysis of aerodynamic characteristics of VJ-101C and DO 31E V/STOL aircraft and comparison with criteria contained in handling requirements documents
N72-32024
Development of criteria specification for supersonic transport aircraft and application to safe handling qualities for all regimes of flight operations
N72-32027
Analysis of factors in stall and post stall operating conditions and effect on aircraft configurations
N72-32029
Full scale wind tunnel tests to determine dynamic stability derivatives of variable-sweep fighter configuration with twin vertical tails
[NASA-TN-D-6909] N72-32044
Design and development of ground to air self-rescue aircraft with vertical takeoff capability and seventy-five nautical mile cruise range
[AD-743477] N72-32059
Numerical analysis of flow distribution about nonaxisymmetric bodies at subsonic and supersonic speeds
[NASA-TT-F-14547] N72-32302

AERODYNAMIC DRAG
Aerodynamic drag and hypersonic aircraft propulsion
N72-32000
Numerical approximation of wave drag characteristics of rectangular planform fairings at zero degree incidence in supersonic flow
[ESDU-71018] N72-32289
Numerical analysis of drag and heat transfer coefficients for meteor bodies during atmospheric entry
[NASA-TT-F-14491] N72-32837

AERODYNAMIC HEATING
Effects of aerodynamic heating and flow patterns on hypersonic vehicle reentry
N72-32001
Atmospheric propulsion, space shuttles, aeroelasticity, and aerodynamic heating
N72-32753

AERODYNAMIC LOADS
Flight load parameters of F-4J aircraft for 49.5 flight hours
[AD-743476] N72-32050

AERODYNAMIC NOISE
Numerical analysis of total sound pressure field emitted by stationary rotating jet and sound field from same jet in motion observed at fixed point on ground
[NASA-TT-F-14489] N72-32047

AERODYNAMIC STABILITY
Aero-normalized yawing moment derivatives
[ESDU-71017] N72-31988
Analysis of aircraft structural flexibility and flight controls interface with application to aircraft design criteria
N72-32031

AERODYNAMICS
Lift curve slope and aerodynamic center position of wings in inviscid supersonic and subsonic flow
[ESDU-70012] N72-31990
Aerodynamics and hypersonic inviscid flow
N72-31995
Research activities for various divisions of National Aeronautical Laboratory for 1970 - 1971
N72-32958

AEROELASTICITY
Analysis of aircraft structural flexibility and flight controls interface with application to aircraft design criteria
N72-32031
Development of mathematical techniques for determining stresses, deformation, and stability of aerospace vehicle structures
[AD-744114] N72-32067
Atmospheric propulsion, space shuttles, aeroelasticity, and aerodynamic heating
N72-32753
Aeroelastic analysis and vibration modes for flutter and flight control system definition
N72-32882

AEROSOLS
Backscattering measurements from atmospheric aerosols using radiometer on Nimbus F satellite
[NOAA-TR-NESS-60] N72-32780

AEROSPACE ENGINEERING
Bibiography of abstracts of articles on rechargable batteries for use in aerospace technology published between 1954 and 1970
[AECL-PAK/LIB-34] N72-32076
General purpose applications computer programs, space technology impact, and NASTRAN
N72-32870
Survey of existing aerospace museums, and feasibility of establishing aerospace museum in western United States Summary, conclusions, and recommendations
[NASA-CR-127333] N72-32955
Potential locations of aerospace museums in western US, existing museums with aerospace exhibits, and activities, curatorial responsibilities, and funding of museums
[NASA-CR-127334] N72-32956
Effects of astronautics on science, technology, and production, and systems analysis of space-oriented human activity
[NASA-TT-F-14517] N72-32978

AEROSPACE MEDICINE
Annotated bibliography and indexes on Aerospace Medicine and Biology - June 1972
[NASA-SP-7011(104)] N72-32080
Biomedical problems of space flight based on experiments in stress physiology and stress psychology
[JPRS-51660] N72-32107

AEROSPACE SCIENCES
Survey of existing aerospace museums, and feasibility of establishing aerospace museum in western United States Summary, conclusions, and recommendations
[NASA-CR-127333] N72-32955
Potential locations of aerospace museums in western US, existing museums with aerospace exhibits, and activities, curatorial responsibilities, and funding of museums
[NASA-CR-127334] N72-32956
Research projects conducted by National Aerospace Laboratory of Netherlands during 1971
N72-32973

AEROSPACE VEHICLES
Development of mathematical techniques for determining stresses, deformation, and stability of aerospace vehicle structures
[AD-744114] N72-32067
Analysis of orbital operations mission to verify existence of safe, feasible design concepts for mission accomplishment - Appendix A
[NASA-CR-115727] N72-32801

AEROTHERMODYNAMICS
Nonequilibrium real gas effects on lifting reentry aerothermodynamics of space shuttle vehicle
N72-32003

AFRICA
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354

AFTERBURNING
Concept for jet noise suppression for afterburning turbojet engine
[NASA-TM-X-68144] N72-32763

AGE FACTOR
Measurement of psychological stress caused by sonic booms during sleep as function of age
[FAA-AM-72-24] N72-32121

AGING (MATERIALS)
Post-aging embrittlement of T-111 tantalum alloy exposed to high temperature environments
[NASA-TN-D-6988] N72-32549

AGING (METALLURGY)
Effects of various pretreatments on microstructural stability of austenitic stainless steels from 550 to 750 C
[ORO-4044-2] N72-32556

AGREEMENTS
Performance of subjects with different cognitive complexity during negotiation in bilateral mode, with mediation, and in presence of observer
[NASA-TT-F-14482] N72-32110

AGRICULTURE
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
Automatic identification of forest and agriculture cover types utilizing ERTS-1 data of Wabash River Basin
[E72-10118] N72-32368
Utilization of ERTS-1 imagery as data sources for Kansas agricultural statistics
[E72-10127] N72-32375
Heat balance factors in agricultural soil
[NASA-TT-F-14511] N72-32393

AIR
Computer programs for calculation of thermodynamic properties of equilibrium air using either time-dependent or shock-capturing computational methods
[NASA-CR-2134] N72-32296

AIR BREATHING ENGINES
Curves for use with total heat and static pressure sampling methods for gross thrust, mass flow, and choking pressure ratio of air breathing engines in flight
[ESDU-69008] N72-32746
Gross thrust and nozzle mass flow measurements for air breathing, ducted flow engines
[ESDU-69007] N72-32747
Intrinsic thrust and drag for air breathing ducted flow engines in flight
[ESDU-69006] N72-32748
Analysis of major pollutants produced by aircraft engine exhaust and development of techniques to reduce level of pollutant emission
[NASA-TM-X-68129] N72-32754
Analysis of several air breathing jet engine systems using general thermodynamic approach based on physical-chemical conversions in gases and high temperatures - Vol. 1
[JPRS-57062-1-PT-1] N72-32757
Development of theory of ramjet and rocket-ramjet engine operation - Vol. 2
[JPRS-57062-2-PT-2] N72-32758

AIR COOLING
Analysis of heat transfer characteristics of three air cooled vanes in turbojet engine using impingement cooling, film cooling, and convection cooling
[NASA-TM-X-2580] N72-32949

AIR FLOW
Uniform supersonic flow of air past sharp-nosed, right circular cones
[ESDU-70010] N72-32293
Numerical analysis of flow distribution about nonaxisymmetric bodies at subsonic and supersonic speeds
[NASA-TT-F-14547] N72-32302
Development of mathematical models for determining mean velocity distribution of two dimensional turbulent boundary layers
[ARL/ME-134] N72-32311
Heat transfer characteristics of air jets impinging on concave side of right circular semicylinder
[NASA-TM-X-2657] N72-32950

AIR JETS
Heat transfer characteristics of air jets impinging on concave side of right circular semicylinder
[NASA-TM-X-2657] N72-32950

AIR MASSES
Formation and evolution of low layer stratiform cloud originating in transformation of warm air mass over cold underlying surface
[NLL-RTS-7059] N72-32600

AIR NAVIGATION
Low altitude flight test to determine accuracy of VOR Tacan air navigation aid
N72-32642
Electromagnetic measurements of Doppler VOR navigation system in Washington, D.C. area
[TN-6050.23-ADD] N72-32643
Development and evaluation of equipment and automation proposed for air traffic control systems for late 1970 and 1980 time period
[AD-743635] N72-32645

AIR POLLUTION
Air pollution study of jet aircraft operations at Los Angeles International Airport, California
[PAPER-71-117] N72-32048
Analysis of major pollutants produced by aircraft engine exhaust and development of techniques to reduce level of pollutant emission
[NASA-TM-X-68129] N72-32754
Analysis of particulate emissions contained in afterburning turbojet engine exhaust operating at ground level - Part I
[AD-744048] N72-32768

AIR SAMPLING
Air pollution study of jet aircraft operations at Los Angeles International Airport, California
[PAPER-71-117] N72-32048

AIR TRAFFIC
Proposal for increasing overall air traffic capability by expansion of charter service between bilateral parties
N72-32983
Forecast of airport activity for major communities in U.S.
N72-32986

AIR TRAFFIC CONTROL
Simulator evaluation of airborne displays used as traffic situation monitors in high density terminal airspace to determine effect on aircraft pilot performance
[FAA-EM-72-3] N72-32137
Cathode ray tube terminals for air traffic control teletypewriter systems
[AT-7330-OT] N72-32183
Nonlinear programming for air traffic control systems
[AD-743569] N72-32596
Design of automatic ground control system for controlling aircraft arriving in random fashion at terminal areas
[NASA-CR-128298] N72-32639

System concept development and testing of aircraft cockpit traffic situation display for improved air traffic control
[FTL-R71-2] N72-32644
Development and evaluation of equipment and automation proposed for air traffic control systems for late 1970 and 1980 time period
[AD-743635] N72-32645
Maximum throughput rate for runway serving single stream of landing aircraft
[AD-744481] N72-32648
Effects of differential target velocity, horizontal or vertical plane conditions, and air traffic controller experience on intersection time estimation accuracy of converging targets
[AD-745119] N72-32649

AIR TRANSPORTATION
Compendium of US ground, water, and air transportation statistics
N72-32966
Optimization model for designing surface and air intercity passenger transport systems, and application to STOL link between Toronto and Montreal
[TR-72-1] N72-32972
Analysis of accomplishments in public transportation developments and predictions of future requirements
N72-32982
Proposal for increasing overall air traffic capability by expansion of charter service between bilateral parties
N72-32983

AIR WATER INTERACTIONS
Dynamic model of air-sea interactions
[AD-743864] N72-32436
Wind and wave characteristics and relationships in Bass Strait, Australia, over 17-year period
N72-32606

AIRBORNE/SPACEBORNE COMPUTERS
Computer architectural language for designing machines to perform onboard computational functions
[AD-743014] N72-32216

AIRCRAFT
Methods for thrust determination in aircraft
[RAE-LIB-TRANS-1650] N72-32755

AIRCRAFT ACCIDENTS
Analysis of midair collisions in US civil aviation for 1969 to 1970 to determine areas of commonality as accident prevention measure
[NTSB-AAS-72-6] N72-32046
Investigation of military aircraft accidents involving vertigo and orientation errors
[AD-743483] N72-32061
Flight recorder insulation and thermal protection for record tapes from crash fires
[FAA-NA-72-49] N72-32937

AIRCRAFT APPROACH SPACING
Design of automatic ground control system for controlling aircraft arriving in random fashion at terminal areas
[NASA-CR-128298] N72-32639

AIRCRAFT CARRIERS
Inflight variable stability airplane investigations during carrier approaches to determine effect of flying qualities parameters on approach performance
N72-32037

AIRCRAFT CONTROL
Proceedings of conference on handling qualities and performance criteria for conventional and V/STOL aircraft
[AGARD-CP-106] N72-32017
Comparison of French and US criteria for aircraft performance and control with application to complicated, high performance aircraft
N72-32018
Comparison of flying quality criteria documents for United Kingdom and US aircraft to show areas of inadequacy in assessing acceptability of aircraft
N72-32019
Procedures for application and revision of Federal Aviation Regulations in determining handling qualities and performance of aircraft
N72-32020
Revisions to handling qualities criteria for V/STOL aircraft with emphasis on instrument flight characteristics
N72-32021
Development of V/STOL aircraft handling qualities criteria specification and analysis of deficiencies
N72-32022
Analysis of criteria for evaluation of high performance aircraft and results obtained on aircraft equipped with control augmentation systems
N72-32025
Analysis of design and functioning characteristics of flying control systems and effect on flight qualities of transport aircraft
N72-32032
Measurement of human operator performance in single axis tracking task during simulated turbulent conditions
N72-32034

AIRCRAFT DESIGN
Aerodynamic problems of designing optimum hypersonic vehicles
[AGARD-LS-42-VOL-1] N72-31994
Momentum theory for optimum design of wing surfaces
N72-31999
Proceedings of conference on handling qualities and performance criteria for conventional and V/STOL aircraft
[AGARD-CP-106] N72-32017
Comparison of French and US criteria for aircraft performance and control with application to complicated, high performance aircraft
N72-32018
Comparison of flying quality criteria documents for United Kingdom and US aircraft to show areas of inadequacy in assessing acceptability of aircraft
N72-32019
Development of V/STOL aircraft handling qualities criteria specification and analysis of deficiencies
N72-32022
Analysis of factors in stall and post stall operating conditions and effect on aircraft configurations
N72-32029
Analysis of aircraft structural flexibility and flight controls interface with application to aircraft design criteria
N72-32031
Analysis of design and functioning characteristics of flying control systems and effect on flight qualities of transport aircraft
N72-32032
Comparison of finite element programs for aircraft design
N72-32884
Research projects conducted by National Aerospace Laboratory of Netherlands during 1971
N72-32973

AIRCRAFT EQUIPMENT
Analysis of sixty element per linear inch plasma display/memory device for use in military aircraft
[AD-744096] N72-32069
Simulator evaluation of airborne displays used as traffic situation monitors in high density terminal airspace to determine effect on aircraft pilot performance
[FAA-EM-72-3] N72-32137

AIRCRAFT FUELS
Future aircraft fuel resource availability and pricing, processing methods, and economic projections for period 1970 to 2000
[NASA-TM-X-62180] N72-32742

AIRCRAFT INSTRUMENTS
In flight monitoring system to measure and record helicopter performance in real time for all six degrees of freedom
[AD-745118] N72-32476
Principles of construction and operation of heading indicators used in civil aviation
[JPRS-57031] N72-32640

AIRCRAFT LANDING
Properties of atmospheric turbulence at low altitudes and effect on aircraft during landing approach and takeoff
N72-32030
Inflight variable stability airplane investigations during carrier approaches to determine effect of flying qualities parameters on approach performance
N72-32037
Static load deflection and vertical drop tests of quarter scale model of CC-115 aircraft equipped with air cushion landing system
[AD-743829] N72-32056
Fatigue test of model E-2 A/B aircraft, using 3000 arrested landings
[AD-743478] N72-32060
Fixed base, variable stability, carrier approach landing simulator, mechanized on hybrid computer
[AD-743768] N72-32283
Maximum throughput rate for runway serving single stream of landing aircraft
[AD-744481] N72-32648

AIRCRAFT MAINTENANCE
Interrelationship of parameters involved in developing reliability test requirements for military helicopters - Vol. 2
[AD-741377] N72-32053
Sensitivity analysis applied to helicopter development reliability test requirements - Vol. 3
[AD-742247] N72-32054

AIRCRAFT NOISE
Analysis of aircraft noise generation and optimization of flight paths to minimize effects of aircraft noise during takeoff
[NASA-TT-F-14468] N72-32042
Development of advanced technology for identifying and minimizing sources of noise in aircraft engines
[NASA-TM-X-68131] N72-32043
Noise encountered with fixed-wing utility-type military aircraft
[AD-742972] N72-32052
Tests to determine acoustic and aerodynamic performance of two choked flow inlets under static conditions
[NASA-TM-X-2629] N72-32765

AIRCRAFT PARTS
Theory, design, and operating principles of aircraft turbomachines
[AD-744183] N72-32773

AIRCRAFT PERFORMANCE
Development of mathematical models for estimating takeoff distance over barriers between thirty and fifty feet high
[EG-5/1-AMEND-A] N72-32014
Proceedings of conference on handling qualities and performance criteria for conventional and V/STOL aircraft
[AGARD-CP-106] N72-32017
Comparison of French and US criteria for aircraft performance and control with application to complicated, high performance aircraft
N72-32018
Comparison of flying quality criteria documents for United Kingdom and US aircraft to show areas of inadequacy in assessing acceptability of aircraft
N72-32019
Procedures for application and revision of Federal Aviation Regulations in determining handling qualities and performance of aircraft
N72-32020
Revisions to handling qualities criteria for V/STOL aircraft with emphasis on instrument flight characteristics
N72-32021
Development of V/STOL aircraft handling qualities criteria specification and analysis of deficiencies
N72-32022
Aerodynamic characteristics of CL-84 tilt wing, V/STOL aircraft and comparison with handling qualities criteria documents
N72-32023
Analysis of criteria for evaluation of high performance aircraft and results obtained on aircraft equipped with control augmentation systems
N72-32025
Application of simulation and analysis techniques for establishing flying qualities criteria for piloted aircraft
N72-32026
Development of criteria specification for supersonic transport aircraft and application to safe handling qualities for all regimes of flight operations
N72-32027
Development and application of pilot rating to determining performance and handling criteria of aircraft
N72-32028
Analysis of factors in stall and post stall operating conditions and effect on aircraft configurations
N72-32029
Analysis of factors affecting lateral-directional handling qualities of aircraft during short takeoff flight
N72-32033
Analysis of methods for predicting aircraft performance and recommendations for computer programs to provide accurate prediction capability
N72-32036
Review of research projects on aircraft handling qualities, vehicle stability, and control characteristics
N72-32038
Aerodynamic characteristics and performance of Russian M-4 supersonic long range aircraft
[AD-744159] N72-32051
Effects of variations in stability derivatives on performance of XV-4 aircraft
[AD-744104] N72-32066
Design, development, and application of flight recorders and crash location instruments used in NATO nations
[AGARD-AR-39] N72-32457

AIRCRAFT PILOTS
Effect of isoniazid on psychomotor performance of aviator instructors
[AD-728823] N72-32120

AIRCRAFT SAFETY
Application of nondestructive testing techniques for improving aircraft safety and aircraft accident reduction
N72-32981

AIRCRAFT STABILITY
Analysis of factors affecting lateral-directional handling qualities of aircraft during short takeoff flight
N72-32033
Analysis of methods for predicting aircraft performance and recommendations for computer programs to provide accurate prediction capability
N72-32036
Inflight variable stability airplane investigations during carrier approaches to determine effect of flying qualities parameters on approach performance
N72-32037
Review of research projects on aircraft handling qualities, vehicle stability, and control characteristics
N72-32038

Digital computer program for investigating effects of instrument error on aircraft stability and control derivatives from flight test data
[NASA-CR-112122] N72-32041

AIRCRAFT STRUCTURES
Analysis of aircraft structural flexibility and flight controls interface with application to aircraft design criteria
N72-32031
Technology and production of laminates, and problems in producing laminated aircraft structures
[AD-742780] N72-32055
Annealed foil fatigue sensor for full-scale C-5A aircraft
[AD-743968] N72-32058

AIRCRAFT TIRES
Numerical analysis of braking forces and frictional coefficients for aircraft tires on hard surface runways - Part 2
[ESDU-71026-PT-2] N72-32013

AIRFIELD SURFACE MOVEMENTS
Measurement of three track runway and taxiway profiles for determining effect of surface conditions on airplane response to ground roughness
[NASA-TN-D-6932] N72-32045

AIRFOILS
Development of procedures for calculating pressure distribution on airfoil in sonic stream
[ESDU-69013] N72-31989
Numerical representations of lift-curve slope and aerodynamic center position of wings in inviscid, subsonic flow
[ESDU-70011] N72-31991

AIRFRAMES
Fatigue test of model E-2 A/B aircraft, using 3000 arrested landings
[AD-743478] N72-32060
Development of test equipment for endurance testing of airframes to determine accumulation of fatigue damage
[AD-744280] N72-32062
Development of mathematical techniques for determining stresses, deformation, and stability of aerospace vehicle structures
[AD-744114] N72-32067
NASTRAN applied to structural design analysis of airframe projects
N72-32885

AIRLINE OPERATIONS
Air pollution study of jet aircraft operations at Los Angeles International Airport, California
[PAPER-71-117] N72-32048
Proposal for increasing overall air traffic capability by expansion of charter service between bilateral parties
N72-32983
Analysis of effects of minimum transportation regulation on development of tourism and resulting expansion of airline operations
N72-32984

AIRPORT PLANNING
Environmental impact statement on proposed construction of Dade County Airport, Trenton, Georgia
[PB-205578-F] N72-32272
Environmental impact statement on proposed construction of Jasper-Pickens County Airport, Jasper, Georgia
[PB-204959-F] N72-32273
Environmental impact statement on proposed development of Neillsville Municipal Airport, Neillsville, Wisconsin
[PB-204576-F] N72-32274
Environmental impact statement on proposed airport construction at West Jefferson, North Carolina
[PB-206552-F] N72-32276
Environmental impact statement on proposed construction of Hemphill Municipal Airport, Hemphill, Texas
[PB-206262-F] N72-32277

AIRPORTS
Air pollution study of jet aircraft operations at Los Angeles International Airport, California
[PAPER-71-117] N72-32048
Environmental impact statement on proposed improvements to Manti-Ephraim Airport, Ephraim, Utah
[PB-207064-F] N72-32270
Environmental impact statement on proposed extension and widening of existing paved runway at Baxley Municipal Airport, Baxley, Georgia
[PB-206167-F] N72-32271
Environmental impact statement of proposal for installation of instrument landing system and approach lighting system at Ottumwa Industrial Airport, Ottumwa, Iowa
[PB-207235-F] N72-32275
Airfield distribution survey of Western European countries to determine effectiveness of STOL and VTOL aircraft
[AD-742096] N72-32279
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280
Development and evaluation of equipment and automation proposed for air traffic control systems for late 1970 and 1980 time period
[AD-743635] N72-32645
Forecast of airport activity for major communities in U.S.
N72-32986

ALASKA
Coordination and establishment of centralized facilities and services for University of Alaska processing of ERTS-1 digital data of Alaskan environment
[E72-10139] N72-32262
Remote sensing of permafrost and geologic hazards in Alaska using ERTS-1
[E72-10060] N72-32333
Management of wildlife habitat in Alaska using ERTS-1 imagery data
[E72-10115] N72-32366
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376
Glaciology and volcanology studies of Wrangell Mountains, Alaska
[E72-10129] N72-32377
Mapping seismically active faults in Alaska using ERTS-1 imagery
[E72-10130] N72-32378
ERTS-1 imagery of water currents and circulation in Prince William Sound
[E72-10132] N72-32380
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381
Study of caribou movements and winter dispersal in Alaska in relation to prevailing snow cover using ERTS-1 imagery
[E72-10134] N72-32382
Study of ice break-up characteristics in Chena River Basin using ERTS-1 imagery
[E72-10135] N72-32383
Survey of seasonal snow cover in Alaska based on ERTS-1 imagery
[E72-10136] N72-32384
Identification, definition, and mapping of terrestrial ecosystems in interior Alaska using ERTS-1 imagery
[E72-10137] N72-32385
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
Aerial photogrammetric surveys of sea otter abundance and distribution at Amchitka Island, Alaska
[BMI-171-135] N72-32422
Characteristics and seasonal variation of prominent relief features at margin of Arctic coastal plain, Alaska
[AD-741354] N72-32429

ALCOHOLS
Graf driving machine for determining sobering effect of caffeine and pervitin on intoxicated individual
[NASA-TT-F-14564] N72-32099

ALGAE
Research on growth and metabolism of green algae, emphasizing Chlorella sorokiniana for closed environment
[NASA-CR-128296] N72-32082

ALGORITHMS
Development of algorithm for solving problem of controlling time-varying linear avionic system with random parameters based on adaptive dual control strategy - Part 1
[AD-744115] N72-32064
Algorithms for reducing real time digital processor for transceiver modulation and demodulation
[AD-744082] N72-32201
Algorithm using random process for relabeling nodes of arbitrary finite element mesh
[NASA-TM-X-2660] N72-32212
Fast algorithm for determining bipolar transistor characteristics
[CEA-CONF-1944] N72-32233
Development of multilevel algorithm for controlling movement of six-legged automatic walking apparatus
[JPRS-57018] N72-32499

ALKALI METALS
Analysis of acoustic wave excitation in flame seeded with alkaline metal
[NASA-TT-F-14594] N72-32660

ALKALINE BATTERIES
Hydroxide of bivalent nickel on nickel oxide electrode of alkaline storage battery
[NASA-TT-F-14449] N72-32073
Development of alkaline battery electrodes using high temperature impregnation of sintered metal bases
[AD-744254] N72-32079

ALKALINE EARTH OXIDES
Molecular energy level radiative lifetimes of metallic and alkaline earth oxides by nonshock tube methods
[AD-744061] N72-32161

ALLOYS
Two-step diffusion welding process of unrecrystallized alloys
[NASA-CASE-LEW-11388-1] N72-32500

ALTIMETERS
Improved descriptions of geoid and geopotential using satellite altimeter data
[NASA-TM-X-66016] N72-32401

ALUMINUM
Penetration of thin aluminum plate by quartz simulating micrometeoroid penetration and dense aluminum plasma expansion
[NASA-CR-123830] N72-32690
Migration of aluminum crystallites on KCl substrates
[NASA-TT-F-14459] N72-32717

ALUMINUM ALLOYS
Fabrication of stabilized Nb3Al superconductors with binary and ternary intermetallics
[NASA-TM-X-68126] N72-32716
Dynamic structural analysis of imperfect, eccentrically stiffened aluminum alloy cylinders under axial compression
[AD-743951] N72-32921

ALUMINUM OXIDES
Slip systems in Al2O3 and yielding in sapphire undergoing basal slip
[AD-743980] N72-32741

AMINO ACIDS
Estimation of amino acid and protein composition by pyrolysis gas chromatography
[NASA-TT-F-14483] N72-32151

AMORPHOUS SEMICONDUCTORS
Single crystal semiconductors and devices and radiation sensitivity of amorphous semiconductors
[AD-743834] N72-32724
Bibliography and summary on electronic structure and transport properties of amorphous semiconductors
[AD-744525] N72-32739

AMPHIBIA
Alkaline phosphate activity of adrenocortical cells in tailed newts
[NASA-TT-F-14577] N72-32104

AMPLIFICATION
Gain measurement of horn antenna using pattern integration and near-field gain correction evaluation
[NASA-CR-128299] N72-32232

AMPLIFIERS
Solid state RF amplifier design in frequency range 0.01 to 20 MHz
[CRC-1220] N72-32176
Two stage, solid state, microcircuit power amplifier in 2.25 GHz region of S band
[NASA-CR-130062] N72-32228
Amplifier and filter system for telluric signals with bandpass characteristics and -3 db rolloff points at .0001 and .1 Hz
N72-32332

ANALOG TO DIGITAL CONVERTERS
Tradeoff analysis in tactical digital to video converter
[AD-744086] N72-32218

ANGULAR ACCELERATION
Effect of impact angular acceleration on human body under emergency conditions-aircraft ejection
[NASA-TT-F-14565] N72-32100

ANGULAR VELOCITY
Axisymmetric incompressible fluid flows in rotational tank with abrupt change in angular speed of cover
[AD-744238] N72-32331

ANISOTROPIC MEDIA
Rotating discontinuities in plasma with anisotropic pressure
[NASA-TT-F-14473] N72-32785

ANISOTROPIC SHELLS
Improved theory of anisotropic shells for deformation determination
[AD-744138] N72-32924

ANTARCTIC REGIONS
Measurement of soil temperatures in Antarctic regions using liquid and resistance thermometers and comparison of results
[NASA-TT-F-14471] N72-32408

ANTENNA ARRAYS
Survey of techniques for supression of sidelobes in antenna array systems
[AD-743742] N72-32193
Array method for reducing ground losses in high frequency antenna communication system
[AD-744469] N72-32247

ANTENNA DESIGN
Effect of endfire rhombic antenna design on antenna radiation patterns
[AD-744091] N72-32249
Telemetry and beacon antenna design for research rockets and satellites
[AD-744095] N72-32251

ANTENNA FEEDS
Development of corrective transverse feed system for spherical reflectors to correct spherical aberrations and provide improved aperture efficiencies
[AD-744064] N72-32238

ANTENNA RADIATION PATTERNS
Development of corrective transverse feed system for spherical reflectors to correct spherical aberrations and provide improved aperture efficiencies
[AD-744064] N72-32238
Effect of endfire rhombic antenna design on antenna radiation patterns
[AD-744091] N72-32249
ANTENNAS
Simulation study to determine 136 MHz and 400 MHz noise temperature of ground antennas for tracking RAE-B during data transmissions
[NASA-TM-X-66047] N72-32184
Automatic maximum power radiated from X band antenna for reentry vehicles
[AD-743994] N72-32244
Sensitivity of radio telescope antennas and receivers
[NASA-TT-F-14441] N72-32469
ANTIFRICTION BEARINGS
Antifriction properties and wear resistance of water lubricated friction bearings made of reinforced epoxy compositions
[AD-744289] N72-32510
ANTIMONY COMPOUNDS
Analysis of reflection spectra of antimony and bismuth chalcogenides to show similarity of compound zone structure
[AD-744278] N72-32734
APOLLO PROJECT
Bioinstrumentation for improving Apollo biomedical ground monitoring system
[NASA-CR-128536] N72-32138
Operational modes handbook for guidance system operations plan involving manned command module earth orbital missions using program SKYLARK 1 - Vol. 4
[NASA-CR-128544] N72-32641
Apollo experience report on photographic equipment and operations during manned space flight programs
[NASA-TN-D-6972] N72-32852
Interdisciplinary study of project management in Apollo program
[NASA-CR-126941] N72-32954
APOLLO SPACECRAFT
Full scale model impact tests to define emergency landing capability of Apollo command modules
[NASA-TN-D-6979] N72-32857
APPROACH CONTROL
Inflight variable stability airplane investigations during carrier approaches to determine effect of flying qualities parameters on approach performance
N72-32037
APPROPRIATIONS
Congressional hearings to determine fiscal year 1973 authorization for military procurement, research and development, and personnel strength
N72-32963
APPROXIMATION
Approximate procedure for calculation of laminar and turbulent compressible boundary layers with heat transfer
[NASA-TT-F-14578] N72-32313
Generalization of regula falsi for approximate calculation of null points of system of nonlinear equations
[NASA-TT-F-14420] N72-32588
Exact nucleon-deuteron elastic single scattering integral and error analysis in sticking factor approximations
[NASA-TN-D-6884] N72-32679
Development of approximate nonlinear theory for orbit estimation
[NASA-CR-127326] N72-32807
ARC DISCHARGES
Three dimensional self-consistent analysis of dynamics of electric arc discharges exposed to arbitrary flow and magnetic fields
[AD-744520] N72-32712
ARCHAEOLOGY
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376
ARCHITECTURE
Architectural acoustics, and physical and technological factors in acoustic field modeling
[NASA-TT-F-14466] N72-32658
ARCTIC REGIONS
Transportation systems for military and civilian operations in northern Arctic regions
[AD-743990] N72-32284
Characteristics and seasonal variation of prominent relief features at margin of Arctic coastal plain, Alaska
[AD-741354] N72-32429
ARGON
Measurement of cosmic X rays in region of 20 eV to 1 keV with argon proportional counter photoionization device
[NASA-CR-130064] N72-32786
ARID LANDS
Preparation of hydrologic atlases of arid land watersheds based on ERTS-1 imagery
[E72-10113] N72-32364
Density and distribution of phreatophytes and other arid land plant communities studied using ERTS-1 imagery
[E72-00114] N72-32365
ARIZONA
Evaluation of ERTS-1 data applications to present status inventory of post-1890 A.D. episode of accelerated erosion and monitoring future erosional changes to Arizona Ecological Test Site
[E72-00104] N72-32357
ARRHYTHMIA
Measurement of arrhythmia in relation to physical and mental work loads
[RAE-LIB-TRANS-1586] N72-32092
ARTIFICIAL CLOUDS
Microwave radiometer measurements at 10.2 and 30 GHz on dust clouds during Event Dial Pack, July 1970
[AD-744084] N72-32441
ARTIFICIAL SATELLITES
Development of computer programs for reducing data obtained from Radiation and Meteoroid Satellite mission
[NASA-CR-128535] N72-32833
Profiles of 14 French satellites
[NASA-TT-F-14604] N72-32854
ASIA
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
ASTRONAUTICS
Effects of astronautics on science, technology, and production, and systems analysis of space-oriented human activity
[NASA-TT-F-14517] N72-32978
ASTRONOMICAL OBSERVATORIES
Stellar image perturbation caused by earth atmospheric temperature heterogeneities and wind speeds, and stellar image jitter amplitude measurement
[AD-744172] N72-32841
ASTRONOMICAL TELESCOPES
Scale model of big telescope on altazimuth mounting and arrangement of control system
[NLL-RTS-7354] N72-32450
ASTRONOMY
Soviet bloc research in astronomy, meteorology, oceanography, geology, and space science - 5 Sept. 1972
[JPRS-56944] N72-32815
Soviet bloc research in astronomy, meteorology, oceanography, geology, and space science - 14 Sept. 1972
[JPRS-57019] N72-32816
ASYMMETRY
Numerical analysis of flow distribution about nonaxisymmetric bodies at subsonic and supersonic speeds
[NASA-TT-F-14547] N72-32302
ASYMPTOTIC SERIES
Asymptotic solution of problems of gas lubrication for high speed bearings with injection
[AD-744293] N72-32511
Asymptotic series analysis of interaction between electrostatic probe and weakly ionized plasma
[AD-744100] N72-32710
ATLANTIC OCEAN
Cyclone intensity forecasting technique for Atlantic and Pacific
[NOAA-TM-NESS-42] N72-32607
ATMOSPHERIC ATTENUATION
Jungfraujoch and high altitude balloon observations of solar spectra and cold stars
[AD-744087] N72-32445
ATMOSPHERIC BOUNDARY LAYER
Atmospheric transport and diffusion in boundary layer, wake turbulence, energy profiles of wind fluctuations, micrometeorology, and diffusion climatology
[TID-25979] N72-32610
ATMOSPHERIC CIRCULATION
Faust model of mesospheric circulation related to noctilucent cloud frequency
[NASA-TT-F-14415] N72-32410
Formation and evolution of low layer stratiform cloud originating in transformation of warm air mass over cold underlying surface
[NLL-RTS-7059] N72-32600
Three dimensional staggered grid model based on Boussinesq equations applied to mesoscale atmospheric motions
[AD-742945] N72-32615
Hydrodynamic theory of atmospheric circulation and numerical weather forecasting
[AD-744184] N72-32636
ATMOSPHERIC COMPOSITION
Development of mathematical model to determine interrelated structure of high altitude profiles based on thermodynamic properties
[NASA-CR-61398] N72-32415
Reduction and analysis of OGO-6 data from neutral atmosphere composition experiment
[NASA-CR-130058] N72-32813
ATMOSPHERIC DENSITY
Neutral density data from OGO-F and geomagnetic storms
[NASA-CR-122479] N72-32390
FORTRAN subroutine for atmospheric density and appropriate corrections
[AD-744077] N72-32438
Atmospheric density, temperature, and winds at high altitudes
[AD-742325] N72-32611
Cause of meteor flares attributed to passage through atmospheric layers of different density
[NASA-TT-F-14475] N72-32824
ATMOSPHERIC DIFFUSION
Atmospheric transport and diffusion in boundary layer, wake turbulence, energy profiles of wind fluctuations, micrometeorology, and diffusion climatology
[TID-25979] N72-32610
ATMOSPHERIC ENTRY
Numerical analysis of drag and heat transfer coefficients for meteor bodies during atmospheric entry
[NASA-TT-F-14491] N72-32837
ATMOSPHERIC HEATING
Phenomena in air layer near ground caused by divergence of radiation balance and fluxes due to exchange of sensible and latent heat
[NASA-TT-F-14552] N72-32604
ATMOSPHERIC MODELS
Propagation of radio waves through lower atmosphere of Venus and simplified model providing atmospheric attenuation factors
[NASA-TM-X-66046] N72-32185
Shock wave propagation in stellar atmospheric models
[NASA-TT-F-14438] N72-32315
Models of D region G factor and derivation of energy balance equation for wave interactions
[NASA-CR-130059] N72-32391
Two-level quasi-geostrophic circulation model restricted to interactions between one or two waves in zonal direction and mean flow
[AD-743766] N72-32433
FORTRAN subroutine for atmospheric density and appropriate corrections
[AD-744077] N72-32438
ATMOSPHERIC PHYSICS
Physical principles of over-the-horizon radar
[JPRS-56925] N72-32175
Microwave radiometer measurements at 10.2 and 30 GHz on dust clouds during Event Dial Pack, July 1970
[AD-744084] N72-32441
ATMOSPHERIC PRESSURE
Effects of ambient air pressures on spray characteristics of swirl type injectors
[NLL-RTS-7250] N72-32287
ATMOSPHERIC RADIATION
Hourly values of atmospheric radiation in equatorial regions from January to June 1972
[NASA-TM-X-66052] N72-32419
ATMOSPHERIC REFRACTION
Some observations of meteorological effects on optical wave propagation
[AD-744472] N72-32632
ATMOSPHERIC TEMPERATURE
Atmospheric density, temperature, and winds at high altitudes
[AD-742325] N72-32611
White Sands Missile Range climate calendar covering mean daily minimum, maximum, and extreme temperature from 1950 to 1971
[AD-743842] N72-32621
Wind turbulence characteristics and temperature data over heterogeneous terrain at White Sands, New Mexico
[AD-743456] N72-32627
Statistical model of atmospheric temperature fluctuations
[AD-743760] N72-32629
Stellar image perturbation caused by earth atmospheric temperature heterogeneities and wind speeds, and stellar image jitter amplitude measurement
[AD-744172] N72-32841
ATMOSPHERIC TURBULENCE
Properties of atmospheric turbulence at low altitudes and effect on aircraft during landing approach and takeoff
N72-32030
Calculation of focal spot variance of focused laser beam caused by atmospheric turbulence
[AD-744099] N72-32535
Atmospheric transport and diffusion in boundary layer, wake turbulence, energy profiles of wind fluctuations, micrometeorology, and diffusion climatology
[TID-25979] N72-32610
Wind turbulence characteristics and temperature data over heterogeneous terrain at White Sands, New Mexico
[AD-743456] N72-32627
Partial differential equation solution for fourth moment of two dimensional plane wave propagating in random medium and multiscatter theories applied to atmospheric turbulence
[AD-744122] N72-32668
Propagation through turbulent atmospheres, nonlinear optics statistics, and cadmium telluride
[AD-744500] N72-32669

ATOMIC EXCITATIONS
Computing excitation cross sections for neutral atoms and positive ions by electron impact for lithium and sodium isoelectronic series
[NASA-TT-F-14430] N72-32680
ATOMIC SPECTRA
Free piston compressor for high pressure He, Na line broadening, and Fe I oscillator strength
[AD-744311] N72-32167
ATOMIC STRUCTURE
Atomic structure of Zr-93 and Zr-91 studied from stripping and pickup reactions induced by 13-MeV incident deuterons on Zr-92
[NASA-TN-D-6911] N72-32673
Bibliography and summary on electronic structure and transport properties of amorphous semiconductors
[AD-744525] N72-32739
ATOMIZING
Development of surface wave instability theory for application to process of atomization from spinning discs and cups
[NRC-12765] N72-32310
ATOMS
Formation of interstellar diatomic molecules by reactions between atoms and ions of interstellar medium and vibrationally excited molecular hydrogen
[NASA-TM-X-66056] N72-32839
ATS 3
Tracking ATS 3 by very long baseline interferometer observations
[NASA-TM-X-66018] N72-32263
AUDITORY PERCEPTION
Influence of biological rhythm on daily periodical hearing in person subjected to prolonged noise
[NASA-TT-F-14568] N72-32089
AUDITORY STIMULI
Effect of circadian variations in sleep-wake cycle on optical and acoustic stimuli reaction times
[RAE-LIB-TRANS-1668] N72-32093
AUGER EFFECT
Adhesion and transfer of polytetrafluoroe thylene to metals, and Auger emission spectroscopy
[NASA-TN-D-6983] N72-32571
AURORAS
Optical and riometer data from 6 to 10 March 1970 geophysical event
[AD-744074] N72-32439
AUSTENITE
Formation of nitrous austenite during diffusion saturation of 38 KhA steel
[AD-744151] N72-32560
AUSTENITIC STAINLESS STEELS
Effect of fast neutron irradiation on ductility of austenitic stainless steel at low and high temperatures
[CONF-720420-4] N72-32555
Effects of various pretreatments on microstructural stability of austenitic stainless steels from 550 to 750 C
[ORO-4044-2] N72-32556
AUSTRALIA
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
Refraction, shoaling, and friction of ocean waves reaching Port Phillip Heads, Australia
N72-32403
Wind and wave characteristics and relationships in Bass Strait, Australia, over 17-year period
N72-32606
AUTOMATIC CONTROL
Automatic maximum power radiated from X band antenna for reentry vehicles
[AD-743994] N72-32244
Adaptive techniques for parameter identification and control of linear, nonlinear, and time varying plants
[AD-744344] N72-32260
Conic, square-edged orifice for turbulent flow in shipboard automatic control systems
[AD-743479] N72-32323
Design and operation of multi-finger automatic mechanical hands for industry
[NASA-TT-F-14554] N72-32493
Design of automatic ground control system for controlling aircraft arriving in random fashion at terminal areas
[NASA-CR-128298] N72-32639
AUTOMATION
Ground surveys and instrumentation for automation of measuring processes
[AD-743995] N72-32435
AUTOMOBILES
Coupling of NASTRAN with second finite element program for static analysis of automotive structures
N72-32876
Compendium of US ground, water, and air transportation statistics
N72-32966
AVALANCHE DIODES
Low cost transient suppressor modules with Zener diode, fuse, and indicator lamp
[AD-743996] N72-32242
AVIONICS
Development of theory for designing optimal inputs to identify parameters in linear dynamic systems and application to avionics installations - Part 2
[AD-744116] N72-32065
Analysis of sixty element per linear inch plasma display/memory device for use in military aircraft
[AD-744096] N72-32069
AXIAL FLOW TURBINES
Rotor vibrations from misalignment by resonant phenomena and by stability loss in lubricating layer
[AD-744265] N72-32770
AXIAL LOADS
Fatigue strength of steel screw threads not greater than 1.0 in diameter subjected to axial loading
[ESDU-69001] N72-32866
AXISYMMETRIC BODIES
Optimum hydrodynamic configurations for submerged minimum drag axisymmetric vehicles in incompressible fluids
[AD-744314] N72-32330
Axisymmetric die in contact with viscoelastic half space and noncommutative operators
[NRC-TT-1572] N72-32909

B

BACKSCATTERING
Backscattering from moving radar target in forested areas
[AD-744049] N72-32189
Backscattering measurements from atmospheric aerosols using radiometer on Nimbus F satellite
[NOAA-TR-NESS-60] N72-32780
BACTERIA
Terminal decontamination of rooms by gaseous formaldehyde
[NASA-TT-F-14544] N72-32087
Effect of various magnesium salts on luminous intensity and duration in phosphorescent bacteria
[NASA-TT-F-14431] N72-32112
Use of plasma cleaning and Auger spectroscopy to remove and monitor organic contamination on Viking spacecraft surfaces
[NASA-CR-128302] N72-32117
BALL BEARINGS
Geometrical analysis of displacements, angles of contact, stresses, and bending moments in radial ball bearing design
[NASA-TT-F-14556] N72-32497
BALLISTIC TRAJECTORIES
Perturbation solution of deceleration trajectory in ballistic reentry in moving atmosphere
[PB-208108] N72-32858
BALLISTICS
Meteorological and ballistics data for launch of Honest John rocket vehicle 141
[AD-743839] N72-32618
Meteorological and ballistics data for launch of Honest John missile launch 352
[AD-743840] N72-32619
Meteorological and ballistics data for launching 03702 Honest John Missile Number 1624 Round 623 AML
[AD-743841] N72-32620
Meteorological and ballistics data for launching of 11602 Lance missile 2131 round 156 EST
[AD-743844] N72-32623
BALLOON SOUNDING
Method for collection of microscopic and submicroscopic particles in stratosphere during sounding balloon ascensions
[NASA-TT-F-14467] N72-32413
BALLUTES
Static structural analysis of meridional tape forces, permeability, and change in model contours on aft half of inflatable decelerator device
[NASA-TN-D-6929] N72-32911
BAND STRUCTURE OF SOLIDS
Infrared absorption spectra measurements of n-type silicon samples following irradiation to define zero-phonon lines and phonon-assisted sideband structure
[AD-743987] N72-32725
BANDPASS FILTERS
Amplifier and filter system for telluric signals with bandpass characteristics and -3 db rolloff points at .0001 and .1 Hz
N72-32332
BANDWIDTH
BANDIT computer program as preprocessor to NASTRAN to automatically resequence grid point numbers for reduced matrix bandwidth
N72-32893
BAROTROPIC FLOW
Time and space differencing schemes applied to barotropic primitive equations
[AD-743748] N72-32630
BATS
Effects of increased gravity on bat echolocating mechanism
[JPRS-56073] N72-32084
BEACONS
Telemetry and beacon antenna design for research rockets and satellites
[AD-744095] N72-32251
BEAMS [RADIATION]
Beam monochromatization by resonator with ion-optical system
[JINR-P9-6252] N72-32266
Measurement of ruby laser induced integral and beam emission from tungsten
[AD-744285] N72-32667
BEAMS [SUPPORTS]
Thin walled, open beam theory and composite element including warping effects and offset shear centers
N72-32880
BEARING [DIRECTION]
Principles of construction and operation of heading indicators used in civil aviation
[JPRS-57031] N72-32640
BEARINGS
Surface hardening for increasing service life of steel bearings
[AD-744256] N72-32506
Analysis of operation conditions for gas turbine rotor bearings from results of computer calculations of their thermal regimes
[AD-744297] N72-32772
BEAUFORT SEA [NORTH AMERICA]
Studies of inner shelf and coastal sedimentation environment of Beaufort Sea using ERTS-1 imagery
[E72-10062] N72-32335
BED REST
Effects of prolonged bed rest on physical work capacity, tilt-table tolerance, and urinary calcium excretion
[NASA-TT-F-14342] N72-32085
Hazards of bed rest as therapeutic measure
[NASA-TT-F-14349] N72-32116
BENARD CELLS
A priori bounds obtained for bifurcation problems in fluid dynamics including Taylor and Benard problems
[AD-744330] N72-32329
BENDING
Bending of strut in one plane under combined action of end loads, side load, and end restraining moments
[ESDU-01.01.16] N72-32863
BENDING MOMENTS
Geometrical analysis of displacements, angles of contact, stresses, and bending moments in radial ball bearing design
[NASA-TT-F-14556] N72-32497
BIBLIOGRAPHIES
Bibliography of abstracts of articles on rechargable batteries for use in aerospace technology published between 1954 and 1970
[AECL-PAK/LIB-34] N72-32076
Annotated bibliography and indexes on Aerospace Medicine and Biology - June 1972
[NASA-SP-7011[104]] N72-32080
Bibliography of computer techniques in scientific research
[JPRS-57027] N72-32208
Bibliography on fluerics and fluidics
[AD-743800] N72-32320
Annotated bibliography on upper atmosphere phenomena in polar regions
[AD-743952] N72-32424
Past and current research on upper atmosphere over polar regions - bibliography
[AD-744090] N72-32440
Bibliographies on seal designs and applications
[AD-744050] N72-32504
Bibliography and summary on electronic structure and transport properties of amorphous semiconductors
[AD-744525] N72-32739
Bibliography of documents used during orbital operations study and description of space program elements - Appendix C
[NASA-CR-128201] N72-32803
BINARY FLUIDS
Analysis of thermal conductivity and diffusivity near critical point of gases and binary liquids
[NASA-CR-2112] N72-32938
BIOACOUSTICS
Bioacoustic criteria incorporating A-weighted sound levels in industry and government
[AD-744522] N72-32670
BIOASSAY
Fungal induced detrimental changes in human-environmental microflora during 90 day test of advanced regenerative life support system
[NASA-CR-112018] N72-32115
BIOCONTROL SYSTEMS
Regulatory mechanism of acetyl-CoA carboxylase activity in fatty acid biosynthesis
[NASA-TT-F-14549] N72-32096
BIOELECTRIC POTENTIAL
Evoked potentials and electrophysiology of nervous system
[NASA-CR-128249] N72-32081

BIOELECTRICITY
Effect of vibration on relationship of bioelectric activity and oxygen demand in cerebrum of rats
[NASA-TT-F-14570] N72-32091
BIOINSTRUMENTATION
Bioinstrumentation for improving Apollo biomedical ground monitoring system
[NASA-CR-128536] N72-32138
BIOLOGICAL EFFECTS
Annotated bibliography and indexes on Aerospace Medicine and Biology - June 1972
[NASA-SP-7011(104)] N72-32080
Effects of prolonged wideband noise on functional condition of human organism
[NASA-TT-F-14567] N72-32088
BIOLOGY
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
BIOLUMINESCENCE
Effect of various magnesium salts on luminous intensity and duration in phosphorescent bacteria
[NASA-TT-F-14431] N72-32112
BIOMEDICAL DATA
Biomedical problems of space flight based on experiments in stress physiology and stress psychology
[JPRS-51660] N72-32107
Data systems for studying hyperbaric physiology of human and animal subjects
[AD-744053] N72-32129
Bioinstrumentation for improving Apollo biomedical ground monitoring system
[NASA-CR-128536] N72-32138
BIONICS
Marine bionics for duplicating biological systems and studying pattern recognition mechanisms in living organisms
[AD-742638] N72-32124
Psychological verification of digitally simulated models of human visual system
[AD-742431] N72-32132
BIOSYNTHESIS
Regulatory mechanism of acetyl-CoA carboxylase activity in fatty acid biosynthesis
[NASA-TT-F-14549] N72-32096
BIOTELEMETRY
Design and operation of completely implantable three channel temperature biotelemetry system
[BNWL-SA-4231] N72-32141
BIRDS
Changes in continental migratory bird habitats studied using ERTS-1 imagery
[E72-00106] N72-32358
BIREFRINGENCE
Nd YAG laser with self compensation of thermally induced stress birefringence
[AD-743979] N72-32525
BISMUTH COMPOUNDS
Analysis of reflection spectra of antimony and bismuth chalcogenides to show similarity of compound zone structure
[AD-744278] N72-32734
BLACK BODY RADIATION
Variable, reproducible blackbody with electrical resistance-heated carbon tube
[NASA-TT-F-14464] N72-32946
BLOOD
Effect of gamma ray irradiation on chromosomes in human blood
[LIB/TRANS-366] N72-32122
BLOOD PLASMA
PH dependent inhibition and reactivation of angiotensin 2 A and angiotensin 2 H and EDTA angiotensinases inhibition in amide cleaving enzymes of human blood plasma
[NASA-TT-F-14457] N72-32118
BLUNT BODIES
Mathematical models for determining viscous interaction effects on sharp leading edges and blunt bodies during reentry at supersonic and hypersonic speeds
N72-32004
BODIES OF REVOLUTION
Steady creep of shells of revolution using Tresk criterion
N72-32906
BODY CENTERED CUBIC LATTICES
Mechanical properties and defects in refractory, body-centered cubic metals
[IS-2773] N72-32553
BODY COMPOSITION (BIOLOGY)
Effect of space flight on changes in blood composition and body functions
[NASA-TT-F-14535] N72-32139
BODY TEMPERATURE
Effect of direct application of K, Ca, Mg, and Ba ions on body temperature and sweat secretion
[NASA-TT-F-14545] N72-32095
Influence of magnesium narcosis on rabbit body temperature
[NASA-TT-F-14550] N72-32097
Design and operation of completely implantable three channel temperature biotelemetry system
[BNWL-SA-4231] N72-32141
BOLTZMANN TRANSPORT EQUATION
Boltzmann kinetic equations applied to analysis of upper atmospheric properties
[NASA-TT-F-14434] N72-32416
BOTANY
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
BOUNDARY LAYER FLOW
Development of invariant model for computation of shear flow of flat plate boundary layer where mean pressure is constant
[NASA-CR-128172] N72-31993
Development of mathematical models for determining mean velocity distribution of two dimensional turbulent boundary layers
[ARL/ME-134] N72-32311
BOUNDARY VALUE PROBLEMS
Boundary value solution for plane wave reflection from underground grid of thin insulated wires
[AD-744079] N72-32261
Collocation method for boundary value problems
[NASA-TT-F-14371] N72-32586
Application of uniqueness theorems for singular solutions to boundary-initial value problems in linear elastodynamics
[AD-744346] N72-32926
BOUSSINESQ APPROXIMATION
Three dimensional staggered grid model based on Boussinesq equations applied to mesoscale atmospheric motions
[AD-742945] N72-32615
BRAKING
Numerical analysis of braking forces and frictional coefficients for aircraft tires on hard surface runways - Part 2
[ESDU-71026-PT-2] N72-32013
BRAYTON CYCLE
Thermal effects on clearance and stiffness of foil journal bearings for Brayton cycle turboalternator
[NASA-CR-2113] N72-32495
BREATHING APPARATUS
Operation and maintenance procedures for fire rescue air pack
[NASA-CR-68614] N72-32135
BROADBAND
Analysis and testing of demultiplexer to determine feasibility and optimum method for modification for broadband operation
[NASA-CR-123825] N72-32172
Broadband FM scheme and modification for TDR satellite
[NASA-CR-130057] N72-32180
BUCKLING
Uniaxial compressive buckling load for thin, flat, rectangular, orthotropic plates
[ESDU-71015] N72-32860
Local buckling coefficients for panels with single- or double-flanged stringers
[ESDU-71014] N72-32861
Initial buckling of flat plates under combined longitudinal and transverse stress
[ESDU-02.01.40] N72-32865
Buckling location and degradation factor due to temperature distribution for interstage of three stage missile
N72-32871
NASTRAN buckling analysis for thin walled cylinder
N72-32872
Buckling analysis of two-lobed circular arc pressure vessel
N72-32873
Buckling of isotropic and waffle-stiffened circular cylinders
N72-32874
Static and buckling analysis using NASTRAN and STARDYNE for graphite fiber reinforced plastic truss structure
N72-32886
Development of equations for numerical analysis of strain in clamped spherical shells subjected to buckling forces
[AD-741198] N72-32917
BUILDINGS
Design problems of fluid flow around rectangular blocks
[ESDU-71016] N72-32288
BUOYS
Calibration and maintenance of equipment designed to monitor meteorological and oceanographic parameters for navigation buoys
[AD-742659] N72-32426
BURNS (INJURIES)
Production of solid carbon dioxide particles in two-stage expansion from bottled gas and application to removal of tissue eschar in third degree burns
[AD-744338] N72-32737

C

C-5 AIRCRAFT
Annealed foil fatigue sensor for full-scale C-5A aircraft
[AD-743968] N72-32058
CADMIUM TELLURIDES
Propagation through turbulent atmospheres, nonlinear optics statistics, and cadmium telluride
[AD-744500] N72-32669
CAFFEINE
Effect of caffeine on athletic performance in 100 yard dash
[NASA-TT-F-14561] N72-32098
Graf driving machine for determining sobering effect of caffeine and pervitin on intoxicated individual
[NASA-TT-F-14564] N72-32099
CALENDARS
White Sands Missile Range climate calendar covering mean daily minimum, maximum, and extreme temperature from 1950 to 1971
[AD-743842] N72-32621
CALIBRATING
Use and calibration of thermometers for soil temperature measurement and systematic error analysis using soil temperature versus depth curves and standard tautochrones
[NASA-TT-F-14479] N72-32407
Calibrating photosensitive devices in ultraviolet range of 1022 to 2500 A
[NASA-TN-D-6991] N72-32474
Adiabatic calorimeter for contact and radiation calibration of heat flux sensors
[AD-744178] N72-32486
CALIFORNIA
Air pollution study of jet aircraft operations at Los Angeles International Airport, California
[PAPER-71-117] N72-32048
Structural and lithologic study of Northern Coast Range and Sacramento Valley, California using ERTS-1 imagery
[E72-10074] N72-32338
CALORIMETERS
Performance tests of thin foil calorimeter designed for measurement of energy deposition profiles and spatial fluence distributions of low energy pulsed electron beams
[AD-743838] N72-32480
Adiabatic calorimeter for contact and radiation calibration of heat flux sensors
[AD-744178] N72-32486
CAMBERED WINGS
Numerical representations of lift-curve slope and aerodynamic center position of wings in inviscid, subsonic flow
[ESDU-70011] N72-31991
CANADA
Potential impact of ERTS, Skylab, and other remote sensing data on cartography and photogrammetry programs in Canada
[M75-2/4] N72-32448
CAPE KENNEDY LAUNCH COMPLEX
Hurricane Emergency Preparedness Plan for FEC at KSC
[NASA-TM-X-68615] N72-32605
CAPILLARY FLOW
Oxygen diffusion under conditions of cerebral hypoxia
[RAE-LIB-TRANS-1661] N72-32108
CAPTIVE TESTS
Engine firing tests of Centaur launch vehicle to evaluate pressurized propellant feed system
[NASA-TN-D-6876] N72-32856
CARBOHYDRATE METABOLISM
Effect of continuous noise and vibration on carbohydrate, fat, and protein metabolism in white rats
[NASA-TT-F-14569] N72-32090
CARBON
Partial pressures of C3 molecule, heat of formation, and entropy
[AD-744046] N72-32162
Mass spectrometric search for polymers in carbon vapors and analysis of graphite vaporization kinetics
[AD-744494] N72-32165
Carbon flash in degenerate region of star of five solar masses
[NASA-TT-F-14427] N72-32835
CARBON COMPOUNDS
Viscosity properties based on X ray diffraction data for iron carbon melts with nickel and tungsten additives
[AD-744263] N72-32563
CARBON DIOXIDE
Production of solid carbon dioxide particles in two-stage expansion from bottled gas and application to removal of tissue eschar in third degree burns
[AD-744338] N72-32737
CARBON DIOXIDE LASERS
Two photon production of electron hole plasma by absorption of CO2 laser light in InSb
[AD-744131] N72-32731

CARBON FIBERS
Thermophysical properties of arc-cast tungsten and MOD 3 carbon to 2600 K
[AD-743976] N72-32559
Tribological characteristics of carbon fiber reinforced plastics, noting improved sliding wear against metal surfaces
[D-MAT-173] N72-32574
Chemical, mechanical, and physical properties of surface treated carbon fibers
[AD-743469] N72-32577
CARCINOGENS
Collagenase and collagen content of hairless mice skin during carcinogenesis
[NASA-TT-F-14579] N72-32105
CARDIOVASCULAR SYSTEM
Effects of prolonged bed rest on physical work capacity, tilt-table tolerance, and urinary calcium excretion
[NASA-TT-F-14342] N72-32085
CARIBOUS
Study of caribou movements and winter dispersal in Alaska in relation to prevailing snow cover using ERTS-1 imagery
[E72-10134] N72-32382
CASCADE RANGE [CA-OR-WA]
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334
CATHODE RAY TUBES
Cathode ray tube terminals for air traffic control teletypewriter systems
[AT-7330-OT] N72-32183
Results of rapid measurement by cathode ray direction finder of electro-atmospheric discharges in storms
[NASA-TT-F-14417] N72-32411
CATIONS
Effect of direct application of K, Ca, Mg, and Ba ions on body temperature and sweat secretion
[NASA-TT-F-14545] N72-32095
CAVITATION CORROSION
Cavitation erosion of rigid surfaces on impact with drops
[RAE-LIB-TRANS-1655] N72-32298
CELESTIAL BODIES
Numerical analysis of orbital elements of celestial body
[NASA-TT-F-14444] N72-32832
CELESTIAL GEODESY
Principles of space geodesy
[AD-741860] N72-32428
CELESTIAL MECHANICS
Principles of space geodesy
[AD-741860] N72-32428
Numerical experiences concerning perturbation in celestial mechanics, using spinor regularization
[NASA-TT-F-14445] N72-32828
CELLS [BIOLOGY]
Alkaline phosphate activity of adrenocortical cells in tailed newts
[NASA-TT-F-14577] N72-32104
CELLULOSE
Thermal decomposition products of cellulose, and extraction and classification of pyrolysis derivatives
[NASA-TT-F-14503] N72-32154
CENTAUR LAUNCH VEHICLE
Engine firing tests of Centaur launch vehicle to evaluate pressurized propellant feed system
[NASA-TN-D-6876] N72-32856
CENTRAL ATLANTIC REGION [US]
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342
CENTRAL NERVOUS SYSTEM
Role of higher sections of central nervous system in motion sickness
[AD-742409] N72-32133
CERAMICS
Effect of grain size on strength of ceramic materials and comparison with aluminum oxide structures
[AD-744047] N72-32576
CEREBRUM
Effect of vibration on relationship of bioelectric activity and oxygen demand in cerebrum of rats
[NASA-TT-F-14570] N72-32091
Oxygen diffusion under conditions of cerebral hypoxia
[RAE-LIB-TRANS-1661] N72-32108
CESIUM DIODES
Indexes and summaries of conference papers on cesium diode performance
[NASA-TM-X-2589] N72-32650
CHALCOGENIDES
Analysis of reflection spectra of antimony and bismuth chalcogenides to show similarity of compound zone structure
[AD-744278] N72-32734
Electrical conductivity of glassy semiconductors to show effects of temperature, thermoelectricity, and photoelectricity
[AD-744249] N72-32736
CHANNEL FLOW
Aerodynamics of swirling flow in annular channel with determination of convective heat transfer
[AD-744157] N72-32321
CHANNELS [DATA TRANSMISSION]
Digital filter design for FDM group demultiplexer single channel
[AD-744089] N72-32248
CHARGE DISTRIBUTION
Potential and charge distribution in surface film p-n junctions
[SRDE-71023] N72-32721
CHARGED PARTICLES
Parametric processes and combination scattering of electromagnetic waves on plasmons in turbulent plasma excited by flux of charged particles in polar ionosphere
[NASA-TT-F-14589] N72-32414
Multiple scattering of tracks and statistical coupling influence, using chords and angle between neighboring tangents
[NASA-TT-F-14426] N72-32681
Radial distribution of charged particle flux in extensive air showers
[INR-1345] N72-32686
Charged particles with random equally probable phases of rotation about Larmor circle
[KHFTI-71-22] N72-32700
CHECKOUT
Design and qualification tests of accelerometers for Misty North event
[UCRL-73654] N72-32478
Nondestructive, structure borne acoustics technique for checkout, monitoring, fault diagnosis, and readiness assessment of mechanical devices for future space missions
[NASA-CR-128171] N72-32491
NASTRAN program checkout and capability demonstration
N72-32902
CHEMICAL ANALYSIS
Research on anomalous water in USSR and abroad
[JPRS-57043] N72-32149
Molecular structures, material characteristics, and analytic techniques
[AD-744107] N72-32166
Electron probe analysis of magnesium, aluminum, and silicon in silicate minerals using low accelerating potential
[NASA-TM-X-62185] N72-32570
Engineering criteria for predicting and preventing flow decay in operational nitrogen tetroxide systems
[AD-744110] N72-32745
CHEMICAL LASERS
Histopathology of argon, ruby, gallium arsenide, neodynium, and carbon dioxide laser induced retinal lesions
[AD-741380] N72-32127
Increase of chemical laser efficiency by gasdynamical pumping
[IPP-IV-10] N72-32522
CHEMICAL PROPERTIES
Chemical, mechanical, and physical properties of surface treated carbon fibers
[AD-743469] N72-32577
CHEMICAL REACTIONS
Hydroxide of bivalent nickel on nickel oxide electrode of alkaline storage battery
[NASA-TT-F-14449] N72-32073
Analysis of hydrogen embrittlement of steel electrolytically plated by zinc cyanide process
[RAE-LIB-TRANS-1644-PT-2] N72-32496
Nonequilibrium flow and chemistry associated with rocket exhaust effluents in upper atmosphere
[AD-744081] N72-32633
Chemical preparation of colloidal magnetic fluids by peptization technique
[BM-TPR-59] N72-32659
Formation of interstellar diatomic molecules by reactions between atoms and ions of interstellar medium and vibrationally excited molecular hydrogen
[NASA-TM-X-66056] N72-32839
Effect of start reaction on temporal variation of combustible gas conditions
[NASA-TT-F-14555] N72-32940
CHIRAL DYNAMICS
Asymptotic algebraic realization of SU[3] in chiral charge algebra and derivation of D/F ratio of hyperon axial vector semileptonic couplings and [g sub A][0]
[TR-72-065] N72-32671
CHOKES [RESTRICTIONS]
Tests to determine acoustic and aerodynamic performance of two choked flow inlets under static conditions
[NASA-TM-X-2629] N72-32765
CHOLESTEROL
Cholesteric liquid crystals as indicators for qualitative and quantitative thermal analysis
[AD-744211] N72-32198
CHROMOSOMES
Effect of gamma ray irradiation on chromosomes in human blood
[LIB/TRANS-366] N72-32122
CIRCADIAN RHYTHMS
Effect of circadian variations in sleep-wake cycle on optical and acoustic stimuli reaction times
[RAE-LIB-TRANS-1668] N72-32093
CIRCUIT DIAGRAMS
Designs and modifications of MED and LED encoding circuity for IMP H and J spacecraft
[NASA-TM-X-66030] N72-32226
Design of high voltage pulse generator based on circuit for forming trapezoidal shaped pulses
[AD-744154] N72-32481
CIRCUITS
Circuit for eliminating reading ambiguities in digital measuring instruments
N72-32465
CIRCULAR CONES
Shock angle for sharp-nosed right circular cone in uniform supersonic flow
[ESDU-70008] N72-32290
Uniform supersonic flow of air past sharp-nosed, right circular cones
[ESDU-70010] N72-32293
Flow deflection of streamline in conical flow field between shock and surface of right circular cone
[ESDU-70009] N72-32294
CIRCULAR CYLINDERS
Mean fluid flow forces around finite-length cylinders in uniform and shear flow
[ESDU-70014-PT-2] N72-32291
Fluid flow forces acting on circular cylinders with smooth and rough surfaces
[ESDU-70013-PT-1] N72-32292
Buckling of isotropic and waffle-stiffened circular cylinders
N72-32874
Vibrations of thin, closed, circular, cylindrical shell during sudden heating
[AD-744253] N72-32929
CIVIL AVIATION
Analysis of midair collisions in US civil aviation for 1969 to 1970 to determine areas of commonality as accident prevention measure
[NTSB-AAS-72-6] N72-32046
Principles of construction and operation of heading indicators used in civil aviation
[JPRS-57031] N72-32640
Analysis of effects of minimum transportation regulation on development of tourism and resulting expansion of airline operations
N72-32984
CL-84 AIRCRAFT
Aerodynamic characteristics of CL-84 tilt wing, V/STOL aircraft and comparison with handling qualities criteria documents
N72-32023
CLASSIFICATIONS
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
CLIMATE
Analysis of interdependence of lake ice and climate in Central North America using ERTS-1 imagery
[E72-10121] N72-32371
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
CLIMATOLOGY
Soil temperature, surface temperature, and climatic factors in mountain and plains regions
[NASA-TT-F-14323] N72-32398
Atmospheric transport and diffusion in boundary layer, wake turbulence, energy profiles of wind fluctuations, micrometeorology, and diffusion climatology
[TID-25979] N72-32610
White Sands Missile Range climate calendar covering mean daily minimum, maximum, and extreme temperature from 1950 to 1971
[AD-743842] N72-32621
Tree ring analysis and radiocarbon dating for determining paleoclimatology
[AD-744129] N72-32634
Use of computer produced wind stratified conditional tables in weather forecasting
[AD-744521] N72-32637
CLINICAL MEDICINE
Lymphoblastic transformation test for studying immunity of pregnant women
[NASA-TT-F-14591] N72-32106
CLOSED ECOLOGICAL SYSTEMS
Research on growth and metabolism of green algae, emphasizing Chlorella sorokiniana for closed environment
[NASA-CR-128296] N72-32082
Fungal induced detrimental changes in human-environmental microflora during 90 day test of advanced regenerative life support system
[NASA-CR-112018] N72-32115
CLOTTING
Effect of flight stress on blood clotting in fighter pilots
[NASA-TT-F-14455] N72-32109

CLOUD COVER
Observational and theoretical data on noctilucent clouds
[NASA-TT-F-14414] N72-32412

CLOUD PHYSICS
General system of differential equations describing evolution of stratiform clouds
[NLL-RTS-7056] N72-32597
Stratiform cloud formation model of origin and growth of collection of drops in homogeneous air mass rising with constant velocity
[NLL-RTS-7057] N72-32598
Calculation of supersaturation and drop size distribution in stratiform clouds, and turbulent diffusion effects
[NLL-RTS-7058] N72-32599
Formation and evolution of low layer stratiform cloud originating in transformation of warm air mass over cold underlying surface
[NLL-RTS-7059] N72-32600
Asymptotic size distribution of large drops in stratiform clouds, and turbulent diffusion effects on distribution
[NLL-RTS-7060] N72-32601
Model of character and growth of stratiform cloud containing water in gas, liquid, and ice phases and of purely crystalline cloud
[NLL-RTS-7061] N72-32602
Field trip study of intense snowstorms in Ishikari Plain, Japan, and similarities to intense snowstorms in Lake Erie and Lake Ontario areas
[PUBL-142] N72-32609

COAL
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336

COASTAL ECOLOGY
Identification of coastal vegetation species in Delaware using ERTS-1 imagery
[E72-10120] N72-32370
Identification of Delaware coastal vegetation species in ERTS-1 imagery
[E72-10142] N72-32389
Summary of synoptic meteorological observations of Japanese coastal marine areas including Central East China Sea, Northern East China Sea, and Nagasaki
[AD-743488] N72-32614

COASTAL PLAINS
Characteristics and seasonal variation of prominent relief features at margin of Arctic coastal plain, Alaska
[AD-741354] N72-32429

COASTAL WATER
Studies of inner shelf and coastal sedimentation environment of Beaufort Sea using ERTS-1 imagery
[E72-10062] N72-32335
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369

COBALT ALLOYS
Mechanical properties of wrought and cast nickel and cobalt alloys in helium/hydrogen or hydrogen mixtures
[NASA-CR-123829] N72-32145

COBALT OXIDES
Influence of stoichiometric deviations on sintering mechanisms of defect CoO
[AD-744517] N72-32578

COCKPIT SIMULATORS
System concept development and testing of aircraft cockpit traffic situation display for improved air traffic control
[FTL-R71-2] N72-32644

CODING
Hybrid coding system study, including efficiency improvement and ratio of bit energy-to-noise density
[NASA-CR-114486] N72-32206
Prefix combinatorial coding for discrete stationary sources
[NASA-TT-F-14484] N72-32209
Techniques for implementing phase coded filters with surface wave delay lines
[AD-744474] N72-32253
Modifications and improved capability of NASTRAN code
N72-32890

COEFFICIENT OF FRICTION
Numerical analysis of braking forces and frictional coefficients for aircraft tires on hard surface runways - Part 2
[ESDU-71026-PT-2] N72-32013

COHERENT RADIATION
Propagation and reception of partially coherent waves in random media
[AD-743833] N72-32194
Coherent Cook demodulator
[AD-744435] N72-32255
Physiological effects of laser radiation and safety precautions followed during laboratory experiments
[JPRS-57029] N72-32516
Amplitude and phase variance of optical signal propagating over folded laser path
[AD-743850] N72-32527
Some observations of meteorological effects on optical wave propagation
[AD-744472] N72-32632

COLD FLOW TESTS
Design and operation of first-stage and two-stage of small, low cost turbofan engine to determine specific work, torque, mass flow, and efficiency
[NASA-TN-D-6967] N72-32072

COLLAGENS
Collagenase and collagen content of hairless mice skin during carcinogenesis
[NASA-TT-F-14579] N72-32105

COLLISION AVOIDANCE
Simulator evaluation of airborne displays used as traffic situation monitors in high density terminal airspace to determine effect on aircraft pilot performance
[FAA-EM-72-3] N72-32137

COLLISIONLESS PLASMAS
Turbulence generated from source of free streaming energy in collisionless plasma
[AD-744230] N72-32709

COLLOCATION
Collocation method for boundary value problems
[NASA-TT-F-14371] N72-32586

COLLOIDAL GENERATORS
Development of surface wave instability theory for application to process of atomization from spinning discs and cups
[NRC-12765] N72-32310

COLLOIDING
Chemical preparation of colloidal magnetic fluids by peptization technique
[BM-TPR-59] N72-32659

COLLOIDS
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550

COLOR
Inhibition of thermal discoloration of polyacrylonitrile between 120 and 200 C by maleic acid and maleic imide
[RAE-LIB-TRANS-1593-[A]-PT-1] N72-32146
Inhibition mechanism of thermal discoloration of polyacrylonitrile by maleic imide supported by solubility studies
[RAE-LIB-TRANS-1593-[B]-PT-2] N72-32147
Color coding scheme for cartographic symbology, using raster plotter software
[AD-740605] N72-32215
Application of color display techniques for analysis of Nimbus infrared radiation data
[NASA-TN-D-6786] N72-32462
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550
Colorimetric measurement of visual color and true color in noctilucent clouds
[NASA-TT-F-14460] N72-32822

COLORADO
Automatic data processing techniques for interdisciplinary analysis of ERTS-1 imagery data for Colorado mountain environments
[E72-10081] N72-32340

COLORIMETRY
Colorimetric measurement of visual color and true color in noctilucent clouds
[NASA-TT-F-14460] N72-32822

COMBINATORIAL ANALYSIS
Combinatorial network synthesis and analysis of binary synchronous counting circuits
[AD-744269] N72-32219

COMBUSTION
Effect of start reaction on temporal variation of combustible gas conditions
[NASA-TT-F-14555] N72-32940

COMBUSTION CHAMBERS
Transpiration-cooled rocket chamber formed of porous metal wall
[NASA-CASE-LEW-11118-1] N72-32501
Nondestructive detection of bond defects in regenerative cooled thrust chamber walls
[NASA-CR-120980] N72-32502

COMBUSTION PRODUCTS
Analysis of major pollutants produced by aircraft engine exhaust and development of techniques to reduce level of pollutant emission
[NASA-TM-X-68129] N72-32754
Analysis of particulate emissions contained in afterburning turbojet engine exhaust operating at ground level - Part 1
[AD-744048] N72-32768

COMETS
Planning intercept missions to comets
[NASA-TM-X-66026] N72-32810
Weakening of stellar brightness observed through Burnham comet
[NASA-TT-F-14453] N72-32829
Mission analysis and spacecraft technical description of Explorer flight to study solar wind integration with Grigg-Skjellerup comet in 1977
[NASA-TM-X-66023] N72-32850

COMMAND MODULES
Full scale model impact tests to define emergency landing capability of Apollo command modules
[NASA-TN-D-6979] N72-32857

COMMERCE
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - studies on earth resources utilization, agriculture, and commerce
[NASA-CR-127336] N72-32975

COMMERCIAL AIRCRAFT
Analysis of midair collisions in US civil aviation for 1969 to 1970 to determine areas of commonality as accident prevention measure
[NTSB-AAS-72-6] N72-32046
Proposal for increasing overall air traffic capability by expansion of charter service between bilateral parties N72-32983
Analysis of effects of minimum transportation regulation on development of tourism and resulting expansion of airline operations N72-32984

COMMITTEE ON SPACE RESEARCH
COSPAR activities in space research N72-32959
Future conferences, international cooperative space programs, UN resolutions, and proposed standards of COSPAR N72-32960

COMMUNICATION CABLES
Flat conductor cables applied to aerospace, military, or commerical industries
[NASA-TM-X-64672] N72-32222

COMMUNICATION SATELLITES
Economic impact of stimulated technological progress in communications satellite research
[NASA-CR-128199] N72-32174
Digital simulation of natural disaster warning communication satellite system
[NASA-TM-X-68135] N72-32182

COMMUNITIES
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376

COMPOSITE MATERIALS
Potential of laminar metal-metal composites for use at elevated temperatures
[NASA-TM-X-68056] N72-32541
Proceedings of conference on solid state physics, fracture mechanics, composite materials, liquid metals, and infrared optical materials - Vol. I
[AD-744204] N72-32564
National Bureau of Standards publication of Standard Reference Materials Price and Availability List for January 1972
[NBS-SP-360] N72-32569
Application of wirewound tungsten composites for design and fabrication of rocket components
[AD-743978] N72-32575
Development of stress analysis method for three dimensional fiber composite structure and optimization routine for selecting minimum weight structure
[AD-744505] N72-32580
Low cycle fatigue tests to determine fatigue strength of glass-epoxy compounds in laminated configuration
[AD-744113] N72-32581
Bloch-Fourier analysis and computer code implementation for calculating micromechanical stress wave response of composite materials
[AD-743898] N72-32918

COMPRESSIBLE BOUNDARY LAYER
Approximate procedure for calculation of laminar and turbulent compressible boundary layers with heat transfer
[NASA-TT-F-14578] N72-32313

COMPRESSION LOADS
Initial buckling of flat plates under combined longitudinal and transverse stress
[ESDU-02.01.40] N72-32865
Dynamic structural analysis of imperfect, eccentrically stiffened aluminum alloy cylinders under axial compression
[AD-743951] N72-32921

COMPRESSIVE STRENGTH
Mechanical compression strength of vertebrae and intervertebral disks in humans
[NASA-TT-F-14566] N72-32101

COMPRESSORS
Measurement and phase analysis of vibrations in reciprocating compressors
[TR-7205.582] N72-32456

COMPUTER COMPONENTS
Design and characteristics of ferrite diode shift register with capability for data regeneration or computation
[AD-744156] N72-32214

COMPUTER GRAPHICS
Interactive computer graphics for on-line determination of neutron spectra from proton recoil distributions
[NASA-TM-X-68062] N72-32205
COMPUTER PROGRAMMING
Developing computer derived map into terminal forecasting system
[AD-744102] N72-32638
COMPUTER PROGRAMS
Analysis of methods for predicting aircraft performance and recommendations for computer programs to provide accurate prediction capability
N72-32036
Digital computer program for investigating effects of instrument error on aircraft stability and control derivatives from flight test data
[NASA-CR-112122] N72-32041
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
Computer program for searching data set for specified group of characters
[NASA-TM-X-66033] N72-32207
Influence of programming language design on program validation
[P-4865] N72-32210
Modification of onboard data management system software to multiprocessor fault tolerant system
[NASA-CR-128553] N72-32211
Color coding scheme for cartographic symbology, using raster plotter software
[AD-740605] N72-32215
Computer programs for calculation of thermodynamic properties of equilibrium air using either time-dependent or shock-capturing computational methods
[NASA-CR-2134] N72-32296
Computer program for calculating expansion tube flow quantities for real gas mixtures including comparison of program results with experimental data
[NASA-TN-D-6830] N72-32300
Operational modes handbook for guidance system operations plan involving manned command module earth orbital missions using program SKYLARK 1 - Vol. 4
[NASA-CR-128544] N72-32641
Computer programs for analyzing axial compressor aerodynamic test data
[AD-744503] N72-32756
Computer program ASAAS for asymmetric stress analysis of axisymmetric solids and application to prediction of thermal stresses in reentry vehicle nosetip
[AD-743897] N72-32859
Application of NASTRAN to static and dynamic structural analysis
[NASA-TM-X-2637] N72-32867
NASTRAN user experiences and benefits
N72-32869
General purpose applications computer programs, space technology impact, and NASTRAN
N72-32870
NASTRAN applied to structural design analysis of airframe projects
N72-32885
Static and buckling analysis using NASTRAN and STARDYNE for graphite fiber reinforced plastic truss structure
N72-32886
Geometric and kinematic properties of isoparametric quadrilateral membrane element for NASTRAN
N72-32887
Simple modifications of NASTRAN program output compared with ASTRAL output
N72-32888
High order, parametric discrete elements for NASTRAN with level 15.1 assembly and geometry module problems
N72-32889
Modifications and improved capability of NASTRAN code
N72-32890
NASTRAN contour plotter, group of subroutines and modifications to plot module
N72-32891
NASTRAN data generation and management using interactive graphics with visual checks of structure and card images
N72-32892
BANDIT computer program as preprocessor to NASTRAN to automatically resequence grid point numbers for reduced matrix bandwidth
N72-32893
High costs of NASTRAN as teaching tool
N72-32894
Structural analysis of 40-story building, using NASTRAN
N72-32895
NASTRAN applied to nuclear problems, including one physics and two engineering problems
N72-32896
NASTRAN thermal analyzer, general purpose finite element heat transfer computer program
N72-32897
VIEW, modification of RAVFAC view factor program for NASTRAN thermal analyzer to simulate radiative heat transfer
N72-32898
Structural dynamic and thermal stress analysis of nuclear reactor vessel support system, using NASTRAN and AXISOL
N72-32899
High pressure turbine blade stress analysis using NASTRAN
N72-32900
NASTRAN substructuring for square plate and static analysis of frame-wall interaction in multistory structures
N72-32901
NASTRAN program checkout and capability demonstration
N72-32902
COMPUTER TECHNIQUES
Bibliography of computer techniques in scientific research
[JPRS-57027] N72-32208
Algorithm using random process for relabeling nodes of arbitrary finite element mesh
[NASA-TM-X-2660] N72-32212
Computer enhancement of structural weld radiographs
[NASA-CR-123814] N72-32490
Computer derived damage functions for engineering of reactor vessel steel embrittlement caused by neutron irradiation, and research progress notes
N72-32977
COMPUTERIZED SIMULATION
Simulation study to determine 136 MHz and 400 MHz noise temperature of ground antennas for tracking RAE-B during data transmissions
[NASA-TM-X-66047] N72-32184
Development of multilevel algorithm for controlling movement of six-legged automatic walking apparatus
[JPRS-57018] N72-32499
Computerized simulation of tropical forest atmosphere
[AD-744482] N72-32613
Computerized simulation for plasma physics
[MATT-894] N72-32704
COMPUTERS
Quantitative analysis of phonocardiograms by electronic computers
[NASA-TT-F-14608] N72-32113
Computer terminals for information retrieval and computer communication controller and software interfaces
[TR-126] N72-32204
CONDENSING
Numerical analysis of stable extinction of condensed systems with respect to critical values of rate of pressure drop in half-closed volume
N72-32941
CONFERENCES
Proceedings of conference on handling qualities and performance criteria for conventional and V/STOL aircraft
[AGARD-CP-106] N72-32017
Proceedings of conference on solid state physics, fracture mechanics, composite materials, liquid metals, and infrared optical materials - Vol. 1
[AD-744204] N72-32564
Proceeding of conference on effects of stress corrosion on cracking in stainless steel, corrosion in high strength alloys, and degradation of silicon nitride materials - Vol. 2
[AD-744205] N72-32565
Conference presentations on design and structural analysis of graphite components
[CONF-701105] N72-32572
Abstracts of conference papers on magnetohydrodynamic stability, plasma generators, and plasma diagnostics
[NYO-3077-185] N72-32707
Papers presented at conference on strength and plasticity
[AD-744495] N72-32927
CONGRESS
Congressional hearings on international agreement between USSR and US on peaceful use of space
N72-32961
Congressional hearings to determine fiscal year 1973 authorization for military procurement, research and development, and personnel strength
N72-32963
Hearings before House Subcommittee on NASA oversight on real estate management and disposal, and excess land declarations at Lewis and Langley Research Centers and Wallops Island
N72-32964
Report to House of Representatives on benefits accruing from space program
[H-REPT-92-1452] N72-32967
CONICAL BODIES
Thin shock layer theory for determining flow pattern around conical wings
N72-31998
CONNECTORS
Flat conductor cable connectors with sealed contacts
[NASA-TM-X-64695] N72-32231
CONSERVATION EQUATIONS
Kinetic model for describing thermodynamic and fluid dynamic processes in high temperature exhaust gas coolers
[AD-744514] N72-32769
CONTINENTAL SHELVES
Studies of inner shelf and coastal sedimentation environment of Beaufort Sea using ERTS-1 imagery
[E72-10062] N72-32335
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381
CONTINUITY [MATHEMATICS]
Continuity equation for radiation transfer theory in nonhomogeneous medium
[NASA-TT-F-14443] N72-32947
CONTINUOUS RADIATION
Absolute radiation intensity of continuum and line emission spectra of shock-heated xenon
[AD-744271] N72-32328
CONTOURS
NASTRAN contour plotter, group of subroutines and modifications to plot module
N72-32891
CONTRACT MANAGEMENT
Detailed examination of human engineering design standard MSFC-STD-267A for manned spacecraft design and recommendations for improvement of standard for future missions
[NASA-CR-61393] N72-32846
CONTRACTION
Stellar evolution and core contraction after central helium burning for star of 5 solar masses
[NASA-TT-F-14452] N72-32838
CONTROL EQUIPMENT
Unit for control of mercury-wetted contact relay
[REPT-6655] N72-32220
CONTROL THEORY
Development of theory for designing optimal inputs to identify parameters in linear dynamic systems and application to avionics installations - Part 2
[AD-744116] N72-32065
Fixed end point problem in optimal control theory
[AD-743795] N72-32595
CONVECTION
Two types of motion in solar atmosphere
[AD-740233] N72-32789
CONVECTIVE HEAT TRANSFER
Aerodynamics of swirling flow in annular channel with determination of convective heat transfer
[AD-744157] N72-32321
CONVEYORS
Analysis of closed loop conveyor system with single loading station, single unloading station, and operating with varying input and output flow rates
[AD-744529] N72-32508
COOLING SYSTEMS
Design of active cooling scheme with discrete cooling passages and measurement of heat transfer distribution on convective cooled surface
[NASA-CR-112047] N72-32933
Numerical analysis of stable extinction of condensed systems with respect to critical values of rate of pressure drop in half-closed volume
N72-32941
Analysis of thermodynamic properties of gas refrigerator with zero dead volume
N72-32942
COPPER ALLOYS
Lattice thermal conductivity of deformed copper-germanium alloy after annealing
[AD-744127] N72-32738
CORE SAMPLING
Effectiveness of ABK-3 device in obtaining reliable data during lateral coring exploration
[NLL-RTS-6743] N72-32256
CORES
Stellar evolution and core contraction after central helium burning for star of 5 solar masses
[NASA-TT-F-14452] N72-32838
CORNERS
Numerical solution to problem of supersonic flow around corner formed by two perpendicular plates
[NASA-TT-F-14537] N72-32301
CORRELATION
Transport phenomena, temporal correlation functions, and partition functions
[CEA-R-3597] N72-32593
CORRELATION COEFFICIENTS
Correlation coefficients for studying longitudinal velocity fluctuations at various distances from wall in circular duct
[NASA-TT-F-14463] N72-32314
CORROSION
Electrochemical measurement of corrosion rates of carbon steel, stainless steel, and Zircaloy 2 operating in high temperature environments
[STU-70-394/U-325] N72-32158
COSMIC DUST
Sources and amount of cosmic dust falling on earth
[NASA-TT-F-14507] N72-32809
COSMIC RAY SHOWERS
Digital recording system for processing scintillation counter pulses in air shower experiment
[NASA-TT-F-14433] N72-32213

COSMIC RAYS
Energy calibration of cosmic ray ionization spectrometer using protons and pions from 9.3 GeV to 17.6 GeV
[NASA-TM-X-66037] N72-32463
Origin and variations of steep electron spectrum and simple mathematical model for interplanetary cosmic rays
[NASA-CR-128282] N72-32776
Interplanetary magnetic field power spectrum and cosmic ray diffusion
[NASA-TM-X-66019] N72-32782
Measurement of cosmic X rays in region of 20 eV to 1 keV with argon proportional counter photoionization device
[NASA-CR-130064] N72-32786
Forbush decreases and cosmic ray intensity variations due to azimuthal asymmetry in solar wind
[KFKI-71-79] N72-32788

COSMONAUTS
Background and preparations for first manned space flight by first cosmonaut
[NASA-TT-F-14606] N72-32979

COSMOS SATELLITES
Angular, spectral, and spatial distribution of infrared radiation data in ionosphere from Cosmos 45 data
[NASA-TT-F-14442] N72-32787

COST ANALYSIS
High costs of NASTRAN as teaching tool
N72-32894

COSTS
Labor costs and techniques for refurbishment of thermal protection system for space shuttles - summary
[NASA-CR-112123] N72-32847

COULOMB POTENTIAL
Divergence of total cross section for three body rearrangement collisions with Coulomb interactions
[NASA-TM-X-66054] N72-32682

COUNTING
Constructibly countable ordinals and gap minimality for well-ordered notation systems
[NASA-CR-128195] N72-32585

COUNTING CIRCUITS
Combinatorial network synthesis and analysis of binary synchronous counting circuits
[AD-744269] N72-32219

COUPLED MODES
Coupled-mode equations for wave propagation in medium modulated by multiple-frequency traveling wave studied with many-space-scale perturbation theory
[AD-743861] N72-32664

CRACK PROPAGATION
Proceeding of conference on effects of stress corrosion on cracking in stainless steel, corrosion in high strength alloys, and degradation of silicon nitride materials - Vol. 2
[AD-744205] N72-32565

CRACKS
Factors affecting data from photoelastic stress freezing for stress concentration near crack tips
[AD-742662] N72-32915

CREEP PROPERTIES
Steady creep of shells of revolution using Tresk criterion
N72-32906

CREEP RUPTURE STRENGTH
Influence of various thermomechanical treatments on creep behavior and time-to-rupture of stainless steel
[KFK-1512] N72-32552

CREEP STRENGTH
Analysis of effect of continuous and discontinuous changes in strain rate on relationship of strain rate, strain, and stress on Udimet alloys
[NASA-TN-D-6937] N72-32547

CREEP TESTS
Influence of different processing histories and microstructure on low temperature creep of Ti-Al-Sn
[SCL-RR-720227] N72-32554

CRITICAL POINT
Analysis of thermal conductivity and diffusivity near critical point of gases and binary liquids
[NASA-CR-2112] N72-32938

CROSS FLOW
Flow control by cross jets
[NASA-TT-F-14548] N72-32303

CRUDE OIL
Future aircraft fuel resource availability and pricing, processing methods, and economic projections for period 1970 to 2000
[NASA-TM-X-62180] N72-32742

CRYSTAL DEFECTS
Junction diffusion, interdiffusion, and self diffusion in lead chalcogenides
[AD-743485] N72-32727

CRYSTAL DISLOCATIONS
Slip systems in Al2O3 and yielding in sapphire undergoing basal slip
[AD-743980] N72-32741

CRYSTAL GROWTH
Analysis of superconducting and Fermi surface properties of single crystal thin films using tunneling techniques
[AD-743442] N72-32726
Production of solid carbon dioxide particles in two-stage expansion from bottled gas and application to removal of tissue eschar in third degree burns
[AD-744338] N72-32737

CRYSTAL LATTICES
Electron spin resonance analysis of yttrium oxides, cerium oxides, and thorium dioxide to determine parametric point defects in single crystals
[AD-744516] N72-32733
Man-made superlattice in monocrystalline semiconductors
[AD-744524] N72-32740

CRYSTAL STRUCTURE
Specimen holder with vertical oscillation and rotation for determining preferred orientation in metals by X ray diffraction
[ARL/MET-81] N72-32468
Effect of grain size on strength of ceramic materials and comparison with aluminum oxide structures
[AD-744047] N72-32576
Development of equations for describing conic pattern reradiated from crystalline surface for analysis of fault structure of crystalline material
[AD-744240] N72-32729

CRYSTALLITES
Migration of aluminum crystallites on KCl substrates
[NASA-TT-F-14459] N72-32717

CRYSTALS
Application of micro-Hall device for determining electrical properties of silicon crystals at low temperatures
[AD-744343] N72-32728

CULTURAL RESOURCES
Man-made culture interpretation and culture revision of small-scale maps using ERTS-1 multispectral imagery
[E72-10098] N72-32351

CURRENT REGULATORS
Precision current regulator for superconducting solenoid
[JINR-P13-6231] N72-32234

CYBERNETICS
Development of schematic representation of pilot workload and functions for various portions of aircraft flight and reaction to various stimuli
N72-32035

CYCLIC LOADS
Low cycle fatigue tests to determine fatigue strength of glass-epoxy compounds in laminated configuration
[AD-744113] N72-32581

CYCLONES
Cyclone intensity forecasting technique for Atlantic and Pacific
[NOAA-TM-NESS-42] N72-32607
Methods of forecasting tropical cyclones and hurricanes
[AD-743763] N72-32628

CYLINDRICAL BODIES
Ultrasonic inspection of weldments on steel cylinder
[TR-7206.588] N72-32544
Dynamic structural analysis of imperfect, eccentrically stiffened aluminum alloy cylinders under axial compression
[AD-743951] N72-32921

CYLINDRICAL SHELLS
Analysis of lower critical load and character of corrugation formation in cylindrical shells subjected to torsion
[AD-744148] N72-32923
Effects of lateral shear strain on rigidity of layered elastic and viscoelastic cylindrical shells
[AD-744252] N72-32928

D

D REGION
Models of D region G factor and derivation of energy balance equation for wave interactions
[NASA-CR-130059] N72-32391
Transition region response of symmetric double probe and application in lower ionosphere
[NASA-TM-X-66013] N72-32400

DATA ACQUISITION
Performance of ERTS-1 data collection system in total system context
[E72-10093] N72-32346
Measurement of soil temperatures in Antarctic regions using liquid and resistance thermometers and comparison of results
[NASA-TT-F-14471] N72-32408
Solar mapping data acquisition, and brightness-temperature and polarization data
[AD-742235] N72-32792

DATA BASES
Multisensor data base for research and development
[AD-744088] N72-32195

DATA COLLECTION PLATFORMS
Performance of ERTS-1 data collection system in total system context
[E72-10093] N72-32346

DATA CONVERTERS
Equipment designs for use in digital line store converters
[BBC-1972/28] N72-32171

DATA MANAGEMENT
Modification of onboard data management system software to multiprocessor fault tolerant system
[NASA-CR-128553] N72-32211
NASTRAN data generation and management using interactive graphics with visual checks of structure and card images
N72-32892

DATA PROCESSING
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
Interactive computer graphics for on-line determination of neutron spectra from proton recoil distributions
[NASA-TM-X-68062] N72-32205
Coordination and establishment of centralized facilities and services for University of Alaska processing of ERTS-1 digital data of Alaskan environment
[E72-10139] N72-32262
Automatic data processing techniques for interdisciplinary analysis of ERTS-1 imagery data for Colorado mountain environments
[E72-10081] N72-32340
Modular multichannel data processing system for turbojet engine testing
[NASA-TM-X-68123] N72-32458

DATA PROCESSING EQUIPMENT
Data systems for studying hyperbaric physiology of human and animal subjects
[AD-744053] N72-32129
Radio Astronomy Explorer B satellite antenna aspect processor
[NASA-TM-X-66032] N72-32173
Development of electronic modules and assemblies for processing telemetry data - Pt. 2
[RAE-LIB-TRANS-1645-PT-2] N72-32224
Coordination and establishment of centralized facilities and services for University of Alaska processing of ERTS-1 digital data of Alaskan environment
[E72-10139] N72-32262

DATA RECORDING
Digital recording system for processing scintillation counter pulses in air shower experiment
[NASA-TT-F-14433] N72-32213

DATA REDUCTION
Incompressibility equation for determining high speed strain hardening of metal during pressure shaping from specimen test data
[AD-744185] N72-32514
Use of holography as tool in various laboratory investigative procedures
[SC-DC-721230] N72-32524
Reduction and analysis of OGO-6 data from neutral atmosphere composition experiment
[NASA-CR-130058] N72-32813

DATA RETRIEVAL
Computer program for searching data set for specified group of characters
[NASA-TM-X-66033] N72-32207

DATA SYSTEMS
Performance of ERTS-1 data collection system in total system context
[E72-10093] N72-32346
Modular multichannel data processing system for turbojet engine testing
[NASA-TM-X-68123] N72-32458
Data management analysis of orbital operations study to include communications, rendezvous, stationkeeping, and detached element operations - Vol. 2 Pt. 3
[NASA-CR-115723] N72-32798

DATA TRANSMISSION
Equipment designs for use in digital line store converters
[BBC-1972/28] N72-32171

DEATH
Death behavior of microorganisms during heat sterilization
[NASA-TT-F-14543] N72-32086

DECAY
Plasma containment and density decay curves
[UCRL-51208] N72-32706

DECELERATION
Perturbation solution of deceleration trajectory in ballistic reentry in moving atmosphere
[PB-208108] N72-32858

DECISION MAKING
Group dynamics and alternative distribution of rewards
[AD-741176] N72-32143

Systems analysis for decision makers
[P-4860] N72-32976
DECOMPRESSION SICKNESS
Effects of posture on decompression and hypoxic stress recovery induced by emergency descent of high altitude/multi-Mach transport aircraft
[AD-741686] N72-32131
DECONTAMINATION
Terminal decontamination of rooms by gaseous formaldehyde
[NASA-TT-F-14544] N72-32087
DEFENSE
Department of Defense environmental quality program
[AD-742107] N72-32442
DEFORMATION
Estimating impact pressure of drop with solid surface, deformation of drop surface, and onset of postcollisional motion of liquid
[RAE-LIB-TRANS-1653] N72-32299
Basic experimental parameters associated with using laser speckle correlation fringes to measure in-plane strain
[AD-744489] N72-32533
Development of equations for numerical analysis of strain in clamped spherical shells subjected to buckling forces
[AD-741198] N72-32917
Linear differential equations describing connection between processes of deformation, thermal conductivity, and diffusion in solid isotropic two-phase solution
[NASA-TT-F-14572] N72-32948
DEGRADATION
Buckling location and degradation factor due to temperature distribution for interstage of three stage missile
N72-32871
DEGREES OF FREEDOM
In flight monitoring system to measure and record helicopter performance in real time for all six degrees of freedom
[AD-745118] N72-32476
DELAWARE
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369
Identification of coastal vegetation species in Delaware using ERTS-1 imagery
[E72-10120] N72-32370
Identification of Delaware coastal vegetation species in ERTS-1 imagery
[E72-10142] N72-32389
DELTA LAUNCH VEHICLE
Structural analysis of isogrid structure of Delta launch vehicle
N72-32877
DELTA WINGS
Analysis of spanwise distribution leading edge tangential suction forces on thin sixty degree delta wing obtained in low speed wind tunnel
[KTH-AERO-TN-58] N72-32011
Hypersonic nonviscous flow about thin three dimensional body of triangular wing shape
[AD-744143] N72-32325
DEMODULATORS
Coherent Cook demodulator
[AD-744435] N72-32255
DEPOSITION
Model of lunar accretion consistent with geochemical and geophysical data relevant to lunar thermal evolution
[NASA-CR-125693] N72-32794
DESERTS
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
DESORPTION
Mass spectroscopy measurements of desorption of oxygen from tungsten by means of electron impact
[NASA-TT-F-14481] N72-32156
DETECTION
Infrasonic wave detection applied to seismology, geophysics, underwater communication, storm forecasting, agriculture, medicine, and industrial nondestructive tests
[AD-743828] N72-32663
DETECTORS
Solid state amplifier for bridge circuit of atomic absorption mercury detector
[RI-7676] N72-32227
DEUTERIUM
Access to uncombined titanium sublayers in presence of inhibiting surface film in sublimation pumping of deuterium
[NASA-TM-X-68119] N72-32542
DEUTERONS
Atomic structure of Zr-93 and Zr-91 studied from stripping and pickup reactions induced by 13-MeV incident deuterons on Zr-92
[NASA-TN-D-6911] N72-32673
Exact nucleon-deuteron elastic single scattering integral and error analysis in sticking factor approximations
[NASA-TN-D-6884] N72-32679
DIAGNOSIS
Diagnosis of heart disease by hybrid computer from phonocardiogram data
[NASA-TT-F-14588] N72-32114
DIATOMIC MOLECULES
Formation of interstellar diatomic molecules by reactions between atoms and ions of interstellar medium and vibrationally excited molecular hydrogen
[NASA-TM-X-66056] N72-32839
DIES
Growth of silicon thick films and application for fabrication of dies and orifices
[NASA-CR-128415] N72-32718
Axisymmetric die in contact with viscoelastic half space and noncommutative operators
[NRC-TT-1572] N72-32909
DIFFERENCE EQUATIONS
Time and space differencing schemes applied to barotropic primitive equations
[AD-743748] N72-32630
DIFFERENTIAL EQUATIONS
Normalized response curves for 1st and 2nd order systems described by linear differential equations with constant coefficients
[ESDU-69005] N72-32584
Use of theta-operator and generalized hypergeometric functions in obtaining infinite series solutions of nth order linear ordinary differential equations
[NASA-TR-R-390] N72-32590
Estimation of errors for approximate solutions of system of first order differential equations
[NASA-TT-F-14432] N72-32591
General system of differential equations describing evolution of stratiform clouds
[NLL-RTS-7056] N72-32597
Linear differential equations describing connection between processes of deformation, thermal conductivity, and diffusion in solid isotropic two-phase solution
[NASA-TT-F-14572] N72-32948
DIFFUSION
Junction diffusion, interdiffusion, and self diffusion in lead chalcogenides
[AD-743485] N72-32727
Interplanetary magnetic field power spectrum and cosmic ray diffusion
[NASA-TM-X-66019] N72-32782
Linear differential equations describing connection between processes of deformation, thermal conductivity, and diffusion in solid isotropic two-phase solution
[NASA-TT-F-14572] N72-32948
DIFFUSION WELDING
Two-step diffusion welding process of unrecrystallized alloys
[NASA-CASE-LEW-11388-1] N72-32500
DIGITAL FILTERS
Digital filter design for FDM group demultiplexer single channel
[AD-744089] N72-32248
DIGITAL SIMULATION
Psychological verification of digitally simulated models of human visual system
[AD-742431] N72-32132
Digital simulation of natural disaster warning communication satellite system
[NASA-TM-X-68135] N72-32182
DIGITAL SYSTEMS
Equipment designs for use in digital line store converters
[BBC-1972/28] N72-32171
Algorithms for reducing real time digital processor for transceiver modulation and demodulation
[AD-744082] N72-32201
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
Digital recording system for processing scintillation counter pulses in air shower experiment
[NASA-TT-F-14433] N72-32213
Coordination and establishment of centralized facilities and services for University of Alaska processing of ERTS-1 digital data of Alaskan environment
[E72-10139] N72-32262
Preliminary design study for advanced fighter type in-flight simulator, employing digital systems
[AD-743970] N72-32282
Circuit for eliminating reading ambiguities in digital measuring instruments
N72-32465
DIGITAL TECHNIQUES
Design and characteristics of ferrite diode shift register with capability for data regeneration or computation
[AD-744156] N72-32214
DIODES
Preparation of n-type material for high diode efficiency and defects in GaP
[NASA-CR-112111] N72-32719
DIRECT CURRENT
Design and development of low power electric motors for industrial and specialized applications
[AD-744510] N72-32252
DISASTERS
Digital simulation of natural disaster warning communication satellite system
[NASA-TM-X-68135] N72-32182
DISCRETE FUNCTIONS
Prefix combinatorial coding for discrete stationary sources
[NASA-TT-F-14484] N72-32209
High order, parametric discrete elements for NASTRAN with level 15.1 assembly and geometry module problems
N72-32889
DISEASES
Evaluation of effect of water stress, disease and leaf area on reflectance characteristics, production, and prediction of disease severity and economic loss of wheat using ERTS-1 imagery
[E72-10126] N72-32374
DISPLAY DEVICES
Analysis of sixty element per linear inch plasma display/memory device for use in military aircraft
[AD-744096] N72-32069
Simulator evaluation of airborne displays used as traffic situation monitors in high density terminal airspace to determine effect on aircraft pilot performance
[FAA-EM-72-3] N72-32137
Application of color display techniques for analysis of Nimbus infrared radiation data
[NASA-TN-D-6786] N72-32462
System concept development and testing of aircraft cockpit traffic situation display for improved air traffic control
[FTL-R71-2] N72-32644
DISTANCE MEASURING EQUIPMENT
Range laws for distance measuring systems using frequency modulation with nonlinear triangular waveform
[AD-744483] N72-32196
Effectiveness of ABK-3 device in obtaining reliable data during lateral coring exploration
[NLL-RTS-6743] N72-32256
Design, development, characteristics, and evaluation of optical theodolites and range finders
[AD-744511] N72-32482
DISTRIBUTION FUNCTIONS
Group dynamics and alternative distribution of rewards
[AD-741176] N72-32143
Relation between systems of polynomials orthogonal with respect to distribution functions
[NASA-TT-F-14480] N72-32592
DIURNAL VARIATIONS
Phenomena in air layer near ground caused by divergence of radiation balance and fluxes due to exchange of sensible and latent heat
[NASA-TT-F-14552] N72-32604
DO-31 AIRCRAFT
Analysis of aerodynamic characteristics of VJ-101C and DO 31E V/STOL aircraft and comparison with criteria contained in handling requirements documents
N72-32024
DOLPHINS
Military navigation satellite time dissemination, dolphin acoustics, biodegradation of crude oil by marine microorganisms, and research notes
N72-32970
DOPPLER NAVIGATION
Electromagnetic measurements of Doppler VOR navigation system in Washington, D.C. area
[TN-6050.23-ADD] N72-32643
DOPPLER RADAR
Pulse pair estimation of Doppler spectrum parameters for first second moments
[AD-744094] N72-32200
DOSIMETERS
Tissue equivalent human phantoms used to measure radiation dose rate of prototypic plutonium circulatory support heat sources
[BNWL-SA-4121] N72-32123
Performance tests of thin foil calorimeter designed for measurement of energy deposition profiles and spatial fluence distributions of low energy pulsed electron beams
[AD-743838] N72-32480
DOWNWASH
Calculating downwash angles behind wings with small span-chord ratios moving at subsonic speeds using nonlinear algebraic equations
N72-32009
DRAG
Intrinsic thrust and drag for air breathing ducted flow engines in flight
[ESDU-69006] N72-32748
DRAG CHUTES
Aerodynamic characteristics and pressure distribution of disk-gap-band parachute deployed behind expandable blunted-cone simulated spacecraft
[NASA-TN-D-6910] N72-32855

DROP SIZE
Calculation of supersaturation and drop size distribution in stratiform clouds, and turbulent diffusion effects
[NLL-RTS-7058] N72-32599
Asymptotic size distribution of large drops in stratiform clouds, and turbulent diffusion effects on distribution
[NLL-RTS-7060] N72-32601
DROP TESTS
Static load deflection and vertical drop tests of quarter scale model of CC-115 aircraft equipped with air cushion landing system
[AD-743829] N72-32056
DROPS [LIQUIDS]
Cavitation erosion of rigid surfaces on impact with drops
[RAE-LIB-TRANS-1655] N72-32298
Estimating impact pressure of drop with solid surface, deformation of drop surface, and onset of post-collisional motion of liquid
[RAE-LIB-TRANS-1653] N72-32299
Effect of droplet impacts on blades of wet steam turbines and resistance of materials to erosion based on number of load cycles and energy capacity of material before fracture
[RAE-LIB-TRANS-1654] N72-32307
Development of equation for determining pressure of spherical drop colliding at right angles with plane rigid surface
[RAE-LIB-TRANS-1652] N72-32308
Stratiform cloud formation model of origin and growth of collection of drops in homogeneous air mass rising with constant velocity
[NLL-RTS-7057] N72-32598
DRUGS
Neurological effects of drug isoniazid on pilot performance
[AD-744808] N72-32119
Effect of isoniazid on psychomotor performance of aviator instructors
[AD-728823] N72-32120
DRY HEAT
Death behavior of microorganisms during heat sterilization
[NASA-TT-F-14543] N72-32086
DUCTED BODIES
Correlation coefficients for studying longitudinal velocity fluctuations at various distances from wall in circular duct
[NASA-TT-F-14463] N72-32314
DUCTED FLOW
Gross thrust and nozzle mass flow measurements for air breathing, ducted flow engines
[ESDU-69007] N72-32747
Intrinsic thrust and drag for air breathing ducted flow engines in flight
[ESDU-69006] N72-32748
DUCTILITY
Effect of fast neutron irradiation on ductility of austenitic stainless steel at low and high temperatures
[CONF-720420-4] N72-32555
DUMMIES
Tissue equivalent human phantoms used to measure radiation dose rate of prototypic plutonium circulatory support heat sources
[BNWL-SA-4121] N72-32123
DUST
Microwave radiometer measurements at 10.2 and 30 GHz on dust clouds during Event Dial Pack, July 1970
[AD-744084] N72-32441
Structure and mineral composition of meteor dust and meteorites
[NASA-TT-F-14472] N72-32825
DUST COLLECTORS
Method for collection of microscopic and submicroscopic particles in stratosphere during sounding balloon ascensions
[NASA-TT-F-14467] N72-32413
DYNAMIC CHARACTERISTICS
Dynamic characteristics and performance of thin film integrated magnetic recording head
[CEA-R-4164] N72-32187
DYNAMIC LOADS
Minimum weight elastic structure designs under dynamic loads
[NASA-TT-F-14540] N72-32904
DYNAMIC STABILITY
Dynamic stability measurement in wind tunnel of lifting body configurations at hypersonic speeds
[AU-648-PT-4] N72-32039
DYNAMIC STRUCTURAL ANALYSIS
Development of test equipment for endurance testing of airframes to determine accumulation of fatigue damage
[AD-744280] N72-32062
Integrated dynamic analysis simulation of space stations with controllable solar arrays
[NASA-CR-112145] N72-32849
Full scale model impact tests to define emergency landing capability of Apollo command modules
[NASA-TN-D-6979] N72-32857
FORTRAN subroutine to NASTRAN for rigid structural dynamic problems
N72-32881
Development of methods for directly integrating governing equations of motion of dynamic structural analysis
[AD-743984] N72-32914
Dynamic structural analysis of imperfect, eccentrically stiffened aluminum alloy cylinders under axial compression
[AD-743951] N72-32921

E

EAR
Effect of noise and vibration on hearing and worker ear structures
[NASA-TT-F-14542] N72-32094
EARLY WARNING SYSTEMS
Digital simulation of natural disaster warning communication satellite system
[NASA-TM-X-68135] N72-32182
EARTH [PLANET]
Sources and amount of cosmic dust falling on earth
[NASA-TT-F-14507] N72-32809
Characteristics of Timation 3 circular polar orbit, and suitability of using laser ranging observations of Timation 3 for studies of earth geodynamics
[NASA-TM-X-66012] N72-32851
EARTH ATMOSPHERE
Prediction of chemical reaction kinetics in laboratory for studies of atmosphere
[LBL-497] N72-32160
Geophysical phenomena in earth atmosphere and solar activity data - Oct. 1971
N72-32396
Development of mathematical model to determine interrelated structure of high altitude profiles based on thermodynamic properties
[NASA-CR-61398] N72-32415
EARTH CRUST
Evaluation of mineral resources based on ERTS-1 identification of continental crust geostructures
[E72-10095] N72-32348
Measuring minimum electrical conductivity in earth crust, for long-range communication through low-conductivity region
[AD-743867] N72-32432
EARTH MOVEMENTS
Models of underthrusting lithospheric plates for calculating displacement and deflection
[NASA-TM-X-66028] N72-32397
EARTH RESOURCES
Domestic sources for titanium metal production
[NMAB-293] N72-32548
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - general findings and studies on international law, water resources management, and recreation
[NASA-CR-127335] N72-32974
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - studies on earth resources utilization, agriculture, and commerce
[NASA-CR-127336] N72-32975
EARTH RESOURCES TECHNOLOGY SATELLITE A
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
Coordination and establishment of centralized facilities and services for University of Alaska processing of ERTS-1 digital data of Alaskan environment
[E72-10139] N72-32262
Remote sensing of permafrost and geologic hazards in Alaska using ERTS-1
[E72-10060] N72-32333
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334
Studies of inner shelf and coastal sedimentation environment of Beaufort Sea using ERTS-1 imagery
[E72-10062] N72-32335
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
Structural and lithologic study of Northern Coast Range and Sacramento Valley, California using ERTS-1 imagery
[E72-10074] N72-32338
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
Automatic data processing techniques for interdisciplinary analysis of ERTS-1 imagery data for Colorado mountain environments
[E72-10081] N72-32340
Development of land use-peak runoff classification system for highway engineering purposes in Maine using ERTS-1 imagery
[E72-10088] N72-32341
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342
Prediction of ephemeral and perennial range quantity and quality during normal grazing season using ERTS-1 imagery
[E72-10090] N72-32343
Application of remotely sensed ERTS-1 imagery to selected reclamation projects
[E72-10091] N72-32344
Cartographic applications of ERTS-1 return beam vidicon imagery
[E72-10092] N72-32345
Performance of ERTS-1 data collection system in total system context
[E72-10093] N72-32346
Thematic mapping based on ERTS-1 return beam vidicon imagery
[E72-10094] N72-32347
Evaluation of mineral resources based on ERTS-1 identification of continental crust geostructures
[E72-10095] N72-32348
Extraction of basin characteristics from ERTS-1 imagery for improving regression estimates of streamflow
[E72-10096] N72-32349
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350
Man-made culture interpretation and culture revision of small-scale maps using ERTS-1 multispectral imagery
[E72-10098] N72-32351
Utilization of ERTS-1 photography for evaluation of Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352
Cartographic evaluation of ERTS-1 orbit and attitude data based on return beam vidicon data
[E72-10100] N72-32353
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
Mapping in polar regions using ERTS-1 return beam vidicon imagery
[E72-10102] N72-32355
Mapping and detection of changes of snow cover on land and glaciers using ERTS-1 imagery
[E72-00103] N72-32356
Evaluation of ERTS-1 data applications to present status inventory of post-1890 A.D. episode of accelerated erosion and monitoring future erosional changes to Arizona Ecological Test Site
[E72-00104] N72-32357
Changes in continental migratory bird habitats studied using ERTS-1 imagery
[E72-00106] N72-32358
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359
Photomapping of US using ERTS-1 return beam vidicon imagery
[E72-10108] N72-32360
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361
Evaluation of suspended sediment plumes in Lake Ontario based on ERTS-1 imagery
[E72-10110] N72-32362
Absorption band analysis of ERTS-1 data for discrimination of iron-rich zones
[E72-10111] N72-32363
Preparation of hydrologic atlases of arid land watersheds based on ERTS-1 imagery
[E72-10113] N72-32364
Density and distribution of phreatophytes and other arid land plant communities studied using ERTS-1 imagery
[E72-00114] N72-32365
Management of wildlife habitat in Alaska using ERTS-1 imagery data
[E72-10115] N72-32366
Timber resource inventory of Washington State using ERTS-1 imagery
[E72-10116] N72-32367
Automatic identification of forest and agriculture cover types utilizing ERTS-1 data of Wabash River Basin
[E72-10118] N72-32368
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369
Identification of coastal vegetation species in Delaware using ERTS-1 imagery
[E72-10120] N72-32370
Analysis of interdependence of lake ice and climate in Central North America using ERTS-1 imagery
[E72-10121] N72-32371
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372

Monitoring of reservoirs and water resources in Kansas using ERTS-1 imagery
[E72-10123] N72-32373
Evaluation of effect of water stress, disease and leaf area on reflectance characteristics, production, and prediction of disease severity and economic loss of wheat using ERTS-1 imagery
[E72-10126] N72-32374
Utilization of ERTS-1 imagery as data sources for Kansas agricultural statistics
[E72-10127] N72-32375
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376
Glaciology and volcanology studies of Wrangell Mountains, Alaska
[E72-10129] N72-32377
Mapping seismically active faults in Alaska using ERTS-1 imagery
[E72-10130] N72-32378
Utilization of ERTS-1 imagery and data as teaching and research tool in geology
[E72-10131] N72-32379
ERTS-1 imagery of water currents and circulation in Prince William Sound
[E72-10132] N72-32380
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381
Study of caribou movements and winter dispersal in Alaska in relation to prevailing snow cover using ERTS-1 imagery
[E72-10134] N72-32382
Study of ice break-up characteristics in Chena River Basin using ERTS-1 imagery
[E72-10135] N72-32383
Survey of seasonal snow cover in Alaska based on ERTS-1 imagery
[E72-10136] N72-32384
Identification, definition, and mapping of terrestrial ecosystems in interior Alaska using ERTS-1 imagery
[E72-10137] N72-32385
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
Analysis of ERTS-1 multispectral data and imagery of northwest Saudi Arabia
[E72-10140] N72-32387
Application of ERTS-1 imagery to geologic and tectonic mapping of Montana
[E72-10141] N72-32388
Identification of Delaware coastal vegetation species in ERTS-1 imagery
[E72-10142] N72-32389
Extraction of textural features of selected frames of ERTS-1 imagery as basis for discrimination between types of categories of interest to ERTS investigators at Kansas
[E72-10124] N72-32453
Study of quaternary landforms and materials in mid-west and Great Plains using ERTS-1 imagery
[E72-10105] N72-32489

EARTH RESOURCES TECHNOLOGY SATELLITES
Potential impact of ERTS, Skylab, and other remote sensing data on cartography and photogrammetry programs in Canada
[M75-2/4] N72-32448

EARTH SURFACE
Spectrophotometry of earth surface from Soyuz 7 and 9 spacecraft data
N72-32466
Worldwide surface refractivity measurements at NASA spacecraft tracking sites for use in tropospheric modeling
[NASA-TN-D-6822] N72-32608

EARTHQUAKES
High gain seismograph stations and long period analog and digital data
[AD-744130] N72-32443

ECOLOGY
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342
Evaluation of ERTS-1 data applications to present status inventory of post-1890 A.D. episode of accelerated erosion and monitoring future erosional changes to Arizona Ecological Test Site
[E72-00104] N72-32357
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369

ECONOMICS
Economic impact of stimulated technological progress in communications satellite research
[NASA-CR-128199] N72-32174
Utilization of ERTS-1 photography for evaluation of Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352
Future aircraft fuel resource availability and pricing, processing methods, and economic projections for period 1970 to 2000
[NASA-TM-X-62180] N72-32742
Analysis of effects of minimum transportation regulation on development of tourism and resulting expansion of airline operations
N72-32984

ECOSYSTEMS
Identification, definition, and mapping of terrestrial ecosystems in interior Alaska using ERTS-1 imagery
[E72-10137] N72-32385

EDGE DISLOCATIONS
Nondestructive X ray topographic study of slip distribution in single alpha-SiC crystals
[AD-744076] N72-32730

EDUCATION
Utilization of ERTS-1 imagery and data as teaching and research tool in geology
[E72-10131] N72-32379
Interdisciplinary and multidisciplinary educational programs for intermodal transportation careers
N72-32980

EIGENVALUES
Characteristic equations for elastic wave propagation
[NASA-CR-128216] N72-32910

EIGENVECTORS
Characteristic equations for elastic wave propagation
[NASA-CR-128216] N72-32910

EJECTION INJURIES
Effect of impact angular acceleration on human body under emergency conditions-aircraft ejection
[NASA-TT-F-14565] N72-32100

ELASTIC DEFORMATION
Improved theory of anisotropic shells for deformation determination
[AD-744138] N72-32924

ELASTIC MEDIA
Reduction of turbulent friction by use of elastic coatings
[NASA-TT-F-14601] N72-32304
Surface deformation and acoustic wave scattering by spherical inclusion in isotropically elastic solid
[RE-440] N72-32655

ELASTIC PROPERTIES
Minimum weight elastic structure designs under dynamic loads
[NASA-TT-F-14540] N72-32904
Effects of lateral shear strain on rigidity of layered elastic and viscoelastic cylindrical shells
[AD-744252] N72-32928

ELASTIC SCATTERING
Exact nucleon-deuteron elastic single scattering integral and error analysis in sticking factor approximations
[NASA-TN-D-6884] N72-32679

ELASTIC WAVES
Characteristic equations for elastic wave propagation
[NASA-CR-128216] N72-32910

ELASTODYNAMICS
Application of uniqueness theorems for singular solutions to boundary-initial value problems in linear elastodynamics
[AD-744346] N72-32926

ELASTOPLASTICITY
Papers presented at conference on strength and plasticity
[AD-744495] N72-32927

ELECTRIC ARCS
Load capacity of wall enclosing electric arc
[NASA-TT-F-14367] N72-32693
Three dimensional self-consistent analysis of dynamics of electric arc discharges exposed to arbitrary flow and magnetic fields
[AD-744520] N72-32712

ELECTRIC BRIDGES
Cable connector configurations for high voltage/current pulse transmission to exploding wire bridge
[NASA-CR-123815] N72-32221

ELECTRIC CONNECTORS
Cable connector configurations for high voltage/current pulse transmission to exploding wire bridge
[NASA-CR-123815] N72-32221
Fabrication and testing of wire and electric connections
[NBS-TN-726] N72-32225
Design and evaluation of reliable integrated termination devices
[AD-744476] N72-32245

ELECTRIC CONTACTS
Unit for control of mercury-wetted contact relay
[REPT-6655] N72-32220

ELECTRIC CURRENT
Means of vapor deposition using electric current and evaporator filament
[NASA-CASE-LAR-10541-1] N72-32487

ELECTRIC DIPOLES
Formulas for excitation of earth ionosphere waveguide by vertical electric Hertzian dipole
[AD-744241] N72-32197

ELECTRIC DISCHARGES
Energizing discharge lamps with trigger circuit for high intensity, incoherent light source
[NASA-CASE-XLE-2529-3] N72-32229
Results of rapid measurement by cathode ray direction finder of electro-atmospheric discharges in storms
[NASA-TT-F-14417] N72-32411
Classification of electrical erosion in materials based on electrode contact or gas discharge
[AD-744155] N72-32665

ELECTRIC ENERGY STORAGE
Development of 100 ampere hour nickel cadmium battery with reduced internal impedance and improved electrical performance
[NASA-CR-112139] N72-32071

ELECTRIC EQUIPMENT
Design, development, and evaluation of roll-up solar array rated at thirty watts per pound
[NASA-CR-128196] N72-32070

ELECTRIC FIELDS
Geophysical phenomena in earth atmosphere and solar activity data - Oct. 1971
N72-32396

ELECTRIC FUSES
Low cost transient suppressor modules with Zener diode, fuse, and indicator lamp
[AD-743996] N72-32242

ELECTRIC GENERATORS
Procedures for determining iron losses in magnetic laminations and measurement of radial airgap inductions in rotating electrical machines
[AD-743591] N72-32077
Hydrazine air fuel cell power generating module capable of 120 watts continuous output
[AD-744477] N72-32078

ELECTRIC IGNITION
Energy source for igniting primers, electrical detonators, and electro-explosive devices
[NASA-TT-F-14525] N72-32935

ELECTRIC MOTORS
Procedures for determining iron losses in magnetic laminations and measurement of radial airgap inductions in rotating electrical machines
[AD-743591] N72-32077
Design and development of low power electric motors for industrial and specialized applications
[AD-744510] N72-32252

ELECTRIC POTENTIAL
Potential and charge distribution in surface film p-n junctions
[SRDE-71023] N72-32721

ELECTRIC POWER PLANTS
Laser driven fusion pulses for generating commercial electric power in power plants
[LA-4858-VOL-1] N72-32521

ELECTRIC POWER SUPPLIES
Operational characteristics and performance measurements of fast-cycling pulsed, high voltage power supply for proton synchrotron
[CERN-72-5] N72-32235
Apollo experience report on design, testing, and development of lunar module electrical power subsystem
[NASA-TN-D-6977] N72-32848
Energy source for igniting primers, electrical detonators, and electro-explosive devices
[NASA-TT-F-14525] N72-32935

ELECTRIC PROPULSION
MPD arc thrustors operating in quasi-steady mode and using electrode vapor for propellant
[NASA-CR-112144] N72-32691

ELECTRIC SPARKS
Radiographic study of structural changes of electrodes of annealed and deformed nickel or copper-nickel powders subjected to single spark discharge
[NLL-RTS-7269] N72-32538

ELECTRIC TERMINALS
Design and evaluation of reliable integrated termination devices
[AD-744476] N72-32245

ELECTRIC WIRE
Wave propagation along thin dielectric coated wire buried in earth
[AD-744078] N72-32199

ELECTRICAL INSULATION
Magnetic properties of insulating and conducting EuTe single crystals at cryogenic temperature
[AD-742603] N72-32722

ELECTRICAL PROPERTIES
Development of 100 ampere hour nickel cadmium battery with reduced internal impedance and improved electrical performance
[NASA-CR-112139] N72-32071
Current-voltage characteristics under load of p-type GaAs on n-type GaAs substrate prepared by liquid epitaxial growth
[NASA-TT-F-14592] N72-32075
Tolerance of transistors to voltage, current, power, and energy variations applied in reverse direction
[RAE-LIB-TRANS-1664] N72-32223
Fast algorithm for determining bipolar transistor characteristics
[CEA-CONF-1944] N72-32233

Design and development of low power electric motors for industrial and specialized applications
[AD-744510] N72-32252
Application of ellipsometry for determining characteristics of thin metal films used for electrical purposes
[AD-744065] N72-32723
Application of micro-Hall device for determining electrical properties of silicon crystals at low temperatures
[AD-744343] N72-32728
Effect of ionizing radiation on field effect transistors
[AD-744093] N72-32732
Preparation and optical and electrical properties of vanadium oxide single crystals and films
[AD-744319] N72-32735
Electrical conductivity of glassy semiconductors to show effects of temperature, thermoelectricity, and photoelectricity
[AD-744249] N72-32736

ELECTRICAL RESISTIVITY
Measuring minimum electrical conductivity in earth crust, for long-range communication through low-conductivity region
[AD-743867] N72-32432
Magnetic properties of insulating and conducting EuTe single crystals at cryogenic temperature
[AD-742603] N72-32722
Variable, reproducible blackbody with electrical resistance-heated carbon tube
[NASA-TT-F-14464] N72-32946

ELECTRO-OPTICS
Application of atmospheric contrast transmission to visual detection and electro-optical lock-on problem
[AD-743560] N72-32192

ELECTROCHEMICAL CELLS
Electrochemical method and effect of iron purity on cathodic hydrogen diffusion through iron membrane
[RAE-LIB-TRANS-1667] N72-32150

ELECTROCHEMISTRY
Electrochemical measurement of corrosion rates of carbon steel, stainless steel, and Zircaloy 2 operating in high temperature environments
[STU-70-394/U-325] N72-32158

ELECTRODES
Development of alkaline battery electrodes using high temperature impregnation of sintered metal bases
[AD-744254] N72-32079
Radiographic study of structural changes of electrodes of annealed and deformed nickel or copper-nickel powders subjected to single spark discharge
[NLL-RTS-7269] N72-32538
Classification of electrical erosion in materials based on electrode contact or gas discharge
[AD-744155] N72-32665
Coaxial, high density, hypervelocity plasma generator and accelerator using electrodes
[NASA-CASE-MFS-20589] N72-32688
MPD arc thrustors operating in quasi-steady mode and using electrode vapor for propellant
[NASA-CR-112144] N72-32691

ELECTROMAGNETIC ABSORPTION
Two photon production of electron hole plasma by absorption of CO2 laser light in InSb
[AD-744131] N72-32731
Vertical incidence absorption in lower equatorial ionosphere during solar half-cycle
[NASA-TM-X-66029] N72-32778

ELECTROMAGNETIC FIELDS
Magnetic and electric coupling parameters between multiconductor transmission line and external electromagnetic field
[AD-743468] N72-32241

ELECTROMAGNETIC INTERFERENCE
Methods for reducing electrical noise interference in acoustic emission signal processing
[BNWL-1596] N72-32259

ELECTROMAGNETIC PULSES
High voltage RF pulse supply for wide gap spark chamber
[EFI-ME-1[71]] N72-32684

ELECTROMAGNETIC RADIATION
Parametric processes and combination scattering of electromagnetic waves on plasmons in turbulent plasma excited by flux of charged particles in polar ionosphere
[NASA-TT-F-14589] N72-32414
Electromagnetic wave excitation in unlimited system consisting of ions and electrons moving in external magnetic field
[AD-744301] N72-32711

ELECTRON BEAMS
Electron beam fabrication of surface wave transducers
[AD-744092] N72-32250

ELECTRON EMISSION
Approximate quantum theory of radiation of fast electrons in magnetic field
[NASA-TT-F-14450] N72-32676
Order and value of quantum corrections to total radiation intensity of fast electrons in magnetic field
[NASA-TT-F-14451] N72-32677

ELECTRON ENERGY
Models of D region G factor and derivation of energy balance equation for wave interactions
[NASA-CR-130059] N72-32391
Performance tests of thin foil calorimeter designed for measurement of energy deposition profiles and spatial fluence distributions of low energy pulsed electron beams
[AD-743838] N72-32480
Atmosphere Explorer C and D measurements of energy input into upper atmosphere due to electrons and protons in energy range 0.2 to 25 keV
[NASA-TM-X-66051] N72-32683
Energetic electrons from solar flares and associated type 3 radio bursts from metric to hectometric
[NASA-TM-X-66031] N72-32779

ELECTRON IMPACT
Mass spectroscopy measurements of desorption of oxygen from tungsten by means of electron impact
[NASA-TT-F-14481] N72-32156

ELECTRON MICROSCOPES
Raman and X ray spectroscopy of lunar glasses and scanning electron microscopy of lunar fines
[NASA-CR-128534] N72-32805

ELECTRON OPTICS
Design and fabrication of binary addressable scan-conversion storage tube
[AD-742521] N72-32237

ELECTRON PLASMA
Two photon production of electron hole plasma by absorption of CO2 laser light in InSb
[AD-744131] N72-32731

ELECTRON PRECIPITATION
OGO 4 data on low energy electron precipitation in polar magnetosphere, and latitude and local time dependence
[NASA-TM-X-66035] N72-32783

ELECTRON PROBES
Electron probe analysis of magnesium, aluminum, and silicon in silicate minerals using low accelerating potential
[NASA-TM-X-62185] N72-32570

ELECTRON TRANSITIONS
Approximate quantum theory of radiation of fast electrons in magnetic field
[NASA-TT-F-14450] N72-32676
Order and value of quantum corrections to total radiation intensity of fast electrons in magnetic field
[NASA-TT-F-14451] N72-32677

ELECTRON TUBES
Design and fabrication of binary addressable scan-conversion storage tube
[AD-742521] N72-32237

ELECTRON TUNNELING
Analysis of superconducting and Fermi surface properties of single crystal thin films using tunneling techniques
[AD-743442] N72-32726

ELECTRONIC EQUIPMENT
Fast algorithm for determining bipolar transistor characteristics
[CEA-CONF-1944] N72-32233
Development and application of circular piezoelectric bender laser tuner to replace conventional laser tuners
[NASA-TM-X-66040] N72-32515

ELECTRONIC MODULES
Development of electronic modules and assemblies for processing telemetry data - Pt. 2
[RAE-LIB-TRANS-1645-PT-2] N72-32224
Designs and modifications of MED and LED encoding circuitry for IMP H and J spacecraft
[NASA-TM-X-66030] N72-32226

ELECTRONS
Origin and variations of steep electron spectrum and simple mathematical model for interplanetary cosmic rays
[NASA-CR-128282] N72-32776

ELECTROPHYSIOLOGY
Evoked potentials and electrophysiology of nervous system
[NASA-CR-128249] N72-32081

ELECTROPLATING
Analysis of hydrogen embrittlement of steel electrolytically plated by zinc cyanide process
[RAE-LIB-TRANS-1644-PT-2] N72-32496

ELECTROSTATIC PROBES
Transition region response of symmetric double probe and application in lower ionosphere
[NASA-TM-X-66013] N72-32400
Comparative study of electrical probe techniques for plasma diagnostics
[NASA-TM-X-66014] N72-32692
Asymptotic series analysis of interaction between electrostatic probe and weakly ionized plasma
[AD-744100] N72-32710

ELEMENTARY PARTICLE INTERACTIONS
Alternate formulation of hadronic part of Glashow-Georgi theory of weak and electromagnetic interactions based on three triplet model
[TR-72-022] N72-32674

ELLIPSOMETERS
Application of ellipsometry for determining characteristics of thin metal films used for electrical purposes
[AD-744065] N72-32723

ELLIPTIC FUNCTIONS
Ten place tables of Jacobian elliptic functions as aid for design and analysis of ultrasharp elliptic filters
[AD-741781] N72-32594

ELLIPTICAL CYLINDERS
Slip flow in continuum physics and vorticity propagation past thin elliptical cylinders under perfect slip condition
[AD-743489] N72-32324

EMBRITTLEMENT
Analysis of hydrogen embrittlement of steel electrolytically plated by zinc cyanide process
[RAE-LIB-TRANS-1644-PT-2] N72-32496
Prerequisites and possible mechanisms for occurrence of liquid metal embrittlement
[AD-744531] N72-32568

EMERGENCIES
Effect of impact angular acceleration on human body under emergency conditions-aircraft ejection
[NASA-TT-F-14565] N72-32100

EMISSION SPECTRA
Absolute radiation intensity of continuum and line emission spectra of shock-heated xenon
[AD-744271] N72-32328
Adhesion and transfer of polytetrafluoroe thylene to metals, and Auger emission spectroscopy
[NASA-TN-D-6983] N72-32571

EMULSIONS
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550

ENDFIRE ARRAYS
Effect of endfire rhombic antenna design on antenna radiation patterns
[AD-744091] N72-32249

ENDOSCOPES
Borescope with adjustable hinged telescoping optical system
[NASA-CASE-MFS-15162] N72-32452

ENERGY DISSIPATION
Models of D region G factor and derivation of energy balance equation for wave interactions
[NASA-CR-130059] N72-32391

ENERGY DISTRIBUTION
Vibrational energy distribution of nitrogen molecules in electronic ground state
[AD-743567] N72-32528

ENERGY TRANSFER
Physical mechanisms responsible for plasma turbulence and conditions for energy exchange and transfer
[NASA-CR-128297] N72-32689

ENGINE DESIGN
Design and operation of first-stage and two-stage of small, low cost turbofan engine to determine specific work, torque, mass flow, and efficiency
[NASA-TN-D-6967] N72-32072
Theory, design, and operating principles of aircraft turbomachines
[AD-744183] N72-32773

ENGINE INLETS
Tests to determine acoustic and aerodynamic performance of two choked flow inlets under static conditions
[NASA-TM-X-2629] N72-32765

ENGINE NOISE
Development of advanced technology for identifying and minimizing sources of noise in aircraft engines
[NASA-TM-X-68131] N72-32043

ENGINE TESTS
Modular multichannel data processing system for turbojet engine testing
[NASA-TM-X-68123] N72-32458

ENGINEERING
Utilization of ERTS-1 photography for evaluation of Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352

ENTROPY
Partial pressures of C3 molecule, heat of formation, and entropy
[AD-744046] N72-32162

ENVIRONMENTAL QUALITY
Department of Defense environmental quality program
[AD-742107] N72-32442

ENVIRONMENTAL SURVEYS
Environmental impact statement on proposed improvements to Manti-Ephraim Airport, Ephraim, Utah
[PB-207064-F] N72-32270
Environmental impact statement on proposed extension and widening of existing paved runway at Baxley Municipal Airport, Baxley, Georgia
[PB-206167-F] N72-32271
Environmental impact statement on proposed construction of Dade County Airport, Trenton, Georgia
[PB-205578-F] N72-32272

Environmental impact statement on proposed construction of Jasper-Pickens County Airport, Jasper, Georgia
[PB-204959-F] N72-32273
Environmental impact statement on proposed development of Neillsville Municipal Airport, Neillsville, Wisconsin
[PB-204576-F] N72-32274
Environmental impact statement of proposal for installation of instrument landing system and approach lighting system at Ottumwa Industrial Airport, Ottumwa, Iowa
[PB-207235-F] N72-32275
Environmental impact statement on proposed airport construction at West Jefferson, North Carolina
[PB-206552-F] N72-32276
Environmental impact statement on proposed construction of Hemphill Municipal Airport, Hemphill, Texas
[PB-206262-F] N72-32277

ENVIRONMENTAL TESTS
Analysis of sixty element per linear inch plasma display/memory device for use in military aircraft
[AD-744096] N72-32069
Microcircuit device environmental tests
[AD-744018] N72-32239
Proceeding of conference on effects of stress corrosion on cracking in stainless steel, corrosion in high strength alloys, and degradation of silicon nitride materials - Vol. 2
[AD-744205] N72-32565

ENZYME ACTIVITY
Regulatory mechanism of acetyl-CoA carboxylase activity in fatty acid biosynthesis
[NASA-TT-F-14549] N72-32096
Collagenase and collagen content of hairless mice skin during carcinogenesis
[NASA-TT-F-14579] N72-32105
PH dependent inhibition and reactivation of angiotensin 2 A and angiotensin 2 H and EDTA angiotensinases inhibition in amide cleaving enzymes of human blood plasma
[NASA-TT-F-14457] N72-32118

EPOXY COMPOUNDS
Antifriction properties and wear resistance of water lubricated friction bearings made of reinforced epoxy compositions
[AD-744289] N72-32510

EPOXY RESINS
Low cycle fatigue tests to determine fatigue strength of glass-epoxy compounds in laminated configuration
[AD-744113] N72-32581

EQUATIONS OF MOTION
Equations of motion for flight vehicles with semi-passive, roll control systems, utilizing flight stability
[SCL-RR-720007] N72-32049
Analysis of closed loop conveyor system with single loading station, single unloading station, and operating with varying input and output flow rates
[AD-744529] N72-32508
Development of methods for directly integrating governing equations of motion of dynamic structural analysis
[AD-743984] N72-32914
Relaxation oscillations of system consisting of elastic fastened load moving along infinite belt with dry friction and viscous resistance
[AD-744261] N72-32925

EQUATIONS OF STATE
Specific heat and equation of state of substance near critical point of heat and gas
[AD-744251] N72-32164

EQUATORS
Hourly values of atmospheric radiation in equatorial regions from January to June 1972
[NASA-TM-X-66052] N72-32419
Vertical incidence absorption in lower equatorial ionosphere during solar half-cycle
[NASA-TM-X-66029] N72-32778

EQUILIBRIUM FLOW
Numerical analysis of equilibrium flows considering ionization, thermal, and barodiffusuon reactions for arbitrary mixtures with various diffusion properties
[JPRS-57017] N72-32306

EQUIPMENT SPECIFICATIONS
Design of instrument based on Ulbrichts sphere for measuring UV radiation incident at arbitary angles
[NASA-TT-F-14416] N72-32470
Design and qualification tests of accelerometers for Misty North event
[UCRL-73654] N72-32478
Adiabatic calorimeter for contact and radiation calibration of heat flux sensors
[AD-744178] N72-32486
Design and operation of multi-finger automatic mechanical hands for industry
[NASA-TT-F-14554] N72-32493

EROSION
Evaluation of ERTS-1 data applications to present status inventory of post-1890 A.D. episode of accelerated erosion and monitoring future erosional changes to Arizona Ecological Test Site
[E72-00104] N72-32357
Classification of electrical erosion in materials based on electrode contact or gas discharge
[AD-744155] N72-32665

ERROR ANALYSIS
Accuracy of methods of redetermining geodetic grids with damaged points
[JPRS-56024] N72-32392
Exact nucleon-deuteron elastic single scattering integral and error analysis in sticking factor approximations
[NASA-TN-D-6884] N72-32679

ERRORS
Estimation of errors for approximate solutions of system of first order differential equations
[NASA-TT-F-14432] N72-32591

ESCAPE SYSTEMS
Design and development of ground to air self-rescue aircraft with vertical takeoff capability and seventy-five nautical mile cruise range
[AD-743477] N72-32059

ESTIMATING
Effects of differential target velocity, horizontal or vertical piane conditions, and air traffic controller experience on intersection time estimation accuracy of converging targets
[AD-745119] N72-32649

EUROPE
Airfield distribution survey of Western European countries to determine effectiveness of STOL and VTOL aircraft
[AD-742096] N72-32279
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280

EUROPEAN SPACE PROGRAMS
Polish space program activities, and medical and biocybernetics research in Albania and Poland
[JPRS-56928] N72-32814

EUROPIUM COMPOUNDS
Magnetic properties of insulating and conducting EuTe single crystals at cryogenic temperature
[AD-742603] N72-32722

EVAPORATION RATE
Relationship of temperature to evaporation in metal surfaces
N72-32540

EVAPORATORS
Means of vapor deposition using electric current and evaporator filament
[NASA-CASE-LAR-10541-1] N72-32487

EXCITATION
Electromagnetic wave excitation in unlimited system consisting of ions and electrons moving in external magnetic field
[AD-744301] N72-32711

EXHAUST DIFFUSERS
Experimental testing of free rotating vaneless diffuser
[AD-744475] N72-32771

EXHAUST GASES
Air pollution study of jet aircraft operations at Los Angeles International Airport, California
[PAPER-71-117] N72-32048
Performance tests of aspirating thermocouple probes designed to measure gas temperature in two-phase gas-liquid system similar to that encountered in jet engine exhaust gas spray cooler
[AD-744513] N72-32484
Increase of chemical laser efficiency by gasdynamical pumping
[IPP-IV-10] N72-32522
Analysis of major pollutants produced by aircraft engine exhaust and development of techniques to reduce level of pollutant emission
[NASA-TM-X-68129] N72-32754
Analysis of particulate emissions contained in afterburning turbojet engine exhaust operating at ground level - Part I
[AD-744048] N72-32768
Kinetic model for describing thermodynamic and fluid dynamic processes in high temperature exhaust gas coolers
[AD-744514] N72-32769

EXHAUST SYSTEMS
Design and construction of prototype vent system for exhausting gas to space from all liquid or two phase mixture of oxygen
[NASA-CR-123826] N72-32844

EXPANDABLE STRUCTURES
Aerodynamic characteristics and pressure distribution of disk-gap-band parachute deployed behind expandable blunted-cone simulated spacecraft
[NASA-TN-D-6910] N72-32855
Static structural analysis of meridional tape forces, permeability, and change in model contours on aft half of inflatable decelerator device
[NASA-TN-D-6929] N72-32911

EXPLORER SATELLITES
Designs and modifications of MED and LED encoding circuity for IMP H and J spacecraft
[NASA-TM-X-66030] N72-32226
Atmosphere Explorer C and D measurements of energy input into upper atmosphere due to electrons and protons in energy range 0.2 to 25 keV
[NASA-TM-X-66051] N72-32683
Mission analysis and spacecraft technical description of Explorer flight to study solar wind integration with Grigg-Skjellerup comet in 1977
[NASA-TM-X-66023] N72-32850

EXPLOSIVE DEVICES
Energy source for igniting primers, electrical detonators, and electro-explosive devices
[NASA-TT-F-14525] N72-32935

EXTINGUISHING
Numerical analysis of stable extinction of condensed systems with respect to critical values of rate of pressure drop in half-closed volume
N72-32941

EXTRATERRESTRIAL LIFE
Analysis of techniques and procedures for determining existence of extraterrestrial intelligent life
[NASA-TM-X-68634] N72-32827

EXTRATERRESTRIAL RADIATION
Development of computer programs for reducing data obtained from Radiation and Meteoroid Satellite mission
[NASA-CR-128535] N72-32833

EXTRATERRESTRIAL RADIO WAVES
Analysis of techniques and procedures for determining existence of extraterrestrial intelligent life
[NASA-TM-X-68634] N72-32827

EYE MOVEMENTS
Effect of maneuvers and flight conditions on helicopter pilot eye movements
[AD-742276] N72-32130
Effect of schedule control and sleep deprivation on human eye movement behavior
[AD-741397] N72-32134

F

F-4 AIRCRAFT
Flight load parameters of F-4J aircraft for 49.5 flight hours
[AD-743476] N72-32050

FABRICATION
Fabrication and testing of wire and electric connections
[NBS-TN-726] N72-32225
Numerical thermomechanical model for welding and loading of fabricated structure
[AD-744212] N72-32930

FABRY-PEROT INTERFEROMETERS
Theory of Fabry-Perot interferometer with flat mirrors and its use in measuring spectral line contours
[AD-744174] N72-32666

FAILURE ANALYSIS
Fatigue failure and fatigue testing of materials, components, and structures
[ARL/SM-336] N72-32907

FAR ULTRAVIOLET RADIATION
Interstellar reddening law in far ultraviolet determined from OAO 2 satellite filter photometry
[NASA-TM-X-66055] N72-32840

FARM CROPS
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - studies on earth resources utilization, agriculture, and commerce
[NASA-CR-127336] N72-32975

FATIGUE [BIOLOGY]
Effects of prolonged wideband noise on functional condition of human organism
[NASA-TT-F-14567] N72-32088

FATIGUE [MATERIALS]
Development of test equipment for endurance testing of airframes to determine accumulation of fatigue damage
[AD-744280] N72-32062
Low cycle fatigue tests to determine fatigue strength of glass-epoxy compounds in laminated configuration
[AD-744113] N72-32581

FATIGUE LIFE
Fatigue test of model E-2 A/B aircraft, using 3000 arrested landings
[AD-743478] N72-32060

FATIGUE TESTS
Fatigue strength of steel screw threads not greater than 1.0 in diameter subjected to axial loading
[ESDU-69001] N72-32866
Fatigue failure and fatigue testing of materials, components, and structures
[ARL/SM-336] N72-32907

FATS
Effect of continuous noise and vibration on carbohydrate, fat, and protein metabolism in white rats
[NASA-TT-F-14569] N72-32090

FATTY ACIDS
Regulatory mechanism of acetyl-CoA carboxylase activity in fatty acid biosynthesis
[NASA-TT-F-14549] N72-32096

FEDERAL BUDGETS
Federal funding to universities and colleges in FY 1971 according to contributing agency, university, and field of science
[NSF-72-316] N72-32962
Congressional hearings to determine fiscal year 1973 authorization for military procurement, research and development, and personnel strength
N72-32963

FEEDBACK CONTROL
Feedback control model for network flow with multiple pure time [or transport] delays
[NASA-TM-X-66020] N72-32258
Time domain reflectometer as closed loop, one-dimensional radar system
[NASA-CR-128198] N72-32460

FEMALES
Lymphoblastic transformation test for studying immunity of pregnant women
[NASA-TT-F-14591] N72-32106

FERMI SURFACES
Analysis of superconducting and Fermi surface properties of single crystal thin films using tunneling techniques
[AD-743442] N72-32726

FERRITES
Modular waveguide assembly consisting of orthogonally intersecting transmission lines coupled by two ferrite resonators
[JPRS-57102] N72-32186

FIBRIN
Effect of flight stress on blood clotting in fighter pilots
[NASA-TT-F-14455] N72-32109

FIELD EFFECT TRANSISTORS
Effect of ionizing radiation on field effect transistors
[AD-744093] N72-32732

FIELD THEORY [PHYSICS]
Application of Treder ansatz to Buchner exact solution of Einstein unified field theory
[RIFP-154] N72-32657

FIGHTER AIRCRAFT
Full scale wind tunnel tests to determine dynamic stability derivatives of variable-sweep fighter configuration with twin vertical tails
[NASA-TN-D-6909] N72-32044

FILAMENT WINDING
Conductor procedure for fabricating twisted multifilament Nb3Sn superconductive ribbon
[NASA-TM-X-68124] N72-32715
Fabrication procedures for filament-wound rocket motor case utilizing high-tensile strength graphite fibers
[NASA-CR-128417] N72-32766

FILMS
Two dimensional motion of incompressible fluid bounded by flexible film
[NASA-TT-F-14575] N72-32312

FILTERS
Techniques for implementing phase coded filters with surface wave delay lines
[AD-744474] N72-32253

FINES
Raman and X ray spectroscopy of lunar glasses and scanning electron microscopy of lunar fines
[NASA-CR-128534] N72-32805

FINITE ELEMENT METHOD
Development of mathematical techniques for determining stresses, deformation, and stability of aerospace vehicle structures
[AD-744114] N72-32067
Algorithm using random process for relabeling nodes of arbitrary finite element mesh
[NASA-TM-X-2660] N72-32212
Development of stress analysis method for three dimensional fiber composite structure and optimization routine for selecting minimum weight structure
[AD-744505] N72-32580
Coupling of NASTRAN with second finite element program for static analysis of automotive structures
N72-32876
NASTRAN finite element representation to predict vibration modes of panels
N72-32878
Static finite element stress analysis of inflated radial car tire
N72-32883
Comparison of finite element programs for aircraft design
N72-32884
NASTRAN thermal analyzer, general purpose finite element heat transfer computer program
N72-32897
Stress analysis of arbitrary shells using finite element method with Lagrange multiplier for obtaining continuity of normal slopes of elementary boundaries
[TB-79] N72-32908
Finite element theory of elastic layered analysis for airfield pavement overlay design
[AD-742337] N72-32916

FIXED WINGS
Noise encountered with fixed-wing utility-type military aircraft
[AD-742972] N72-32052

FLAMES
Analysis of acoustic wave excitation in flame seeded with alkaline metal
[NASA-TT-F-14594] N72-32660

FLARED BODIES
Mathematical procedure for calculating fragmentation of meteor bodies in flares
[NASA-TT-F-14456] N72-32823

FLAT CONDUCTORS
Flat conductor cables applied to aerospace, military, or commerical industries
[NASA-TM-X-64672] N72-32222
Flat conductor cable connectors with sealed contacts
[NASA-TM-X-64695] N72-32231

FLAT PLATES
Normal forces and center of pressure positions for thin flat plates
[ESDU-70015] N72-32295
Initial buckling of flat plates under combined longitudinal and transverse stress
[ESDU-02.01.40] N72-32865

FLEXIBLE BODIES
Analysis of aircraft structural flexibility and flight controls interface with application to aircraft design criteria
N72-32031
Vibration of thin flexible membrane at intermediate acoustic frequencies
[AD-743865] N72-32919

FLEXING
Flexural properties of lipped Z, or channel stringers
[ESDU-01.00.03] N72-32864

FLIGHT CHARACTERISTICS
Procedures for designing hypersonic lifting vehicles
N72-32002
Analysis of instrumentation error effects on identification accuracy of aircraft parameters
[NASA-CR-112121] N72-32040

FLIGHT CONDITIONS
Effect of maneuvers and flight conditions on helicopter pilot eye movements
[AD-742276] N72-32130

FLIGHT CONTROL
Development of controller design procedure for aircraft throughout entire flight envelope based on quadratic optimal control technology
[AD-744491] N72-32068
Aeroelastic analysis and vibration modes for flutter and flight control system definition
N72-32882

FLIGHT LOAD RECORDERS
Design, development, and application of flight recorders and crash location instruments used in NATO nations
[AGARD-AR-39] N72-32457

FLIGHT PATHS
Analysis of aircraft noise generation and optimization of flight paths to minimize effects of aircraft noise during takeoff
[NASA-TT-F-14468] N72-32042

FLIGHT RECORDERS
Design, development, and application of flight recorders and crash location instruments used in NATO nations
[AGARD-AR-39] N72-32457
Flight recorder insulation and thermal protection for record tapes from crash fires
[FAA-NA-72-49] N72-32937

FLIGHT SAFETY
Application of nondestructive testing techniques for improving aircraft safety and aircraft accident reduction
N72-32981

FLIGHT SIMULATION
Application of simulation and analysis techniques for establishing flying qualities criteria for piloted aircraft
N72-32026
Measurement of human operator performance in single axis tracking task during simulated turbulent conditions
N72-32034

FLIGHT SIMULATORS
Preliminary design study for advanced fighter type in-flight simulator, employing digital systems
[AD-743970] N72-32282
Fixed base, variable stability, carrier approach landing simulator, mechanized on hybrid computer
[AD-743768] N72-32283
Technique to generate nondispersive, continuously variable microwave time delay for simulation of approach of radar to target
[AD-744242] N72-32286

FLIGHT STABILITY TESTS
Equations of motion for flight vehicles with semi-passive, roll control systems, utilizing flight stability
[SCL-RR-720007] N72-32049

FLIGHT STRESS
Effect of flight stress on blood clotting in fighter pilots
[NASA-TT-F-14455] N72-32109

FLIGHT TESTS
Comparison of French and US criteria for aircraft performance and control with application to complicated, high performance aircraft
N72-32018
Procedures for application and revision of Federal Aviation Regulations in determining handling qualities and performance of aircraft
N72-32020
Analysis of criteria for evaluation of high performance aircraft and results obtained on aircraft equipped with control augmentation systems
N72-32025
Development and application of pilot rating to determining performance and handling criteria of aircraft
N72-32028
Analysis of instrumentation error effects on identification accuracy of aircraft parameters
[NASA-CR-112121] N72-32040
Digital computer program for investigating effects of instrument error on aircraft stability and control derivatives from flight test data
[NASA-CR-112122] N72-32041
In flight monitoring system to measure and record helicopter performance in real time for all six degrees of freedom
[AD-745118] N72-32476

FLIP-FLOPS
Combinatorial network synthesis and analysis of binary synchronous counting circuits
[AD-744269] N72-32219

FLOW CHARACTERISTICS
Modifications of low speed open-circuit wind tunnel to improve airflow characteristics
[AD-743454] N72-32285
Diagnostic techniques for determining fluid flow properties at nozzle exit and in lasing region of supersonic diffusion laser system
[AD-743999] N72-32531

FLOW DEFLECTION
Flow deflection of streamline in conical flow field between shock and surface of right circular cone
[ESDU-7009] N72-32294

FLOW DISTRIBUTION
Thin shock layer theory for determining flow pattern around conical wings
N72-31998
Effects of aerodynamic heating and flow patterns on hypersonic vehicle reentry
N72-32001
Analysis of inviscid asymmetric hypersonic flow fields enveloping smooth bodies of general shape
[NASA-CR-2123] N72-32297
Wind tunnel flow field measurements around Mars lander model using hot-film anemometers under simulated Mars surface conditions
[NASA-TN-D-6820] N72-32853

FLOW EQUATIONS
Development of invariant model for computation of shear flow of flat plate boundary layer where mean pressure is constant
[NASA-CR-128172] N72-31993
Numerical analysis of flow distribution about nonaxisymmetric bodies at subsonic and supersonic speeds
[NASA-TT-F-14547] N72-32302
Numerical analysis of equilibrium flows considering ionization, thermal, and barodiffusuon reactions for arbitrary mixtures with various diffusion properties
[JPRS-57017] N72-32306
Characteristics of initial development of turbulent free mixing layer for hypersonic speeds and profile data downstream of exit of hypersonic nozzle
[NASA-TM-X-2602] N72-32318

FLOW GEOMETRY
Analysis of three dimensional flow separations of supersonic streams flowing around solid cylindrical and circular jet obstructions above flat plate
[JPRS-56959] N72-32305
Flow geometry of powder metallurgical flow control devices
[SCL-DR-710351] N72-32319

FLOW RESISTANCE
Reduction of turbulent friction by use of elastic coatings
[NASA-TT-F-14601] N72-32304
Correlation of flow resistance and reflection coefficient for weak shock waves
[AD-744509] N72-32326

FLOW THEORY
Development of invariant model for computation of shear flow of flat plate boundary layer where mean pressure is constant
[NASA-CR-128172] N72-31993
Thin shock layer theory for determining flow pattern around conical wings
N72-31998
Numerical analysis of equilibrium flows considering ionization, thermal, and barodiffusuon reactions for arbitrary mixtures with various diffusion properties
[JPRS-57017] N72-32306
Development of surface wave instability theory for application to process of atomization from spinning discs and cups
[NRC-12765] N72-32310

FLOW VELOCITY
Correlation coefficients for studying longitudinal velocity fluctuations at various distances from wall in circular duct
[NASA-TT-F-14463] N72-32314
Engineering criteria for predicting and preventing flow decay in operational nitrogen tetroxide systems
[AD-744110] N72-32745
FLOW VISUALIZATION
Development of techniques for visualization of water flow in water tunnel installation
[ARL/A-NOTE-335] N72-32309
FLUID DYNAMICS
Two dimensional motion of incompressible fluid bounded by flexible film
[NASA-TT-F-14575] N72-32312
A priori bounds obtained for bifurcation problems in fluid dynamics including Taylor and Benard problems
[AD-744330] N72-32329
Kinetic model for describing thermodynamic and fluid dynamic processes in high temperature exhaust gas coolers
[AD-744514] N72-32769
FLUID FILTERS
Water soluble filter for trapping airborne microorganisms
[NASA-TT-F-14440] N72-32111
FLUID FLOW
Design problems of fluid flow around rectangular blocks
[ESDU-71016] N72-32288
Mean fluid flow forces around finite-length cylinders in uniform and shear flow
[ESDU-70014-PT-2] N72-32291
Fluid flow forces acting on circular cylinders with smooth and rough surfaces
[ESDU-70013-PT-1] N72-32292
Development of surface wave instability theory for application to process of atomization from spinning discs and cups
[NRC-12765] N72-32310
Design and development of thermal-mechanical pump for transmitting warming fluid through fluid circuit to control temperature of spacecraft instrumentation
[NASA-CASE-NPO-11417] N72-32498
FLUID MECHANICS
Research reports on fluid mechanics and plasma dynamics
[AD-744533] N72-32713
FLUIDICS
Bibliography on fluerics and fluidics
[AD-743800] N72-32320
FLUIDIZED BED PROCESSORS
Heat transfer mechanism in heterogeneous fluidized bed of granular material, based on packet theory
[NLL-RTS-7421] N72-32932
FLUIDS
Chemical preparation of colloidal magnetic fluids by peptization technique
[BM-TPR-59] N72-32659
FLUTTER
Aeroelastic analysis and vibration modes for flutter and flight control system definition
N72-32882
Critical flutter velocity for membrane in nonconservative system
[NASA-TT-F-14576] N72-32905
FLUX [RATE]
Measurement of shock waves and flux velocity of Jupiter solar wind during minimum activity
[NASA-TT-F-14470] N72-32821
FLUX DENSITY
Classification, distribution, and interpretation of peak flux density spectra of solar radio bursts
[AD-741750] N72-32791
FOCUSING
Calculation of focal spot variance of focused laser beam caused by atmospheric turbulence
[AD-744099] N72-32535
FOIL BEARINGS
Thermal effects on clearance and stiffness of foil journal bearings for Brayton cycle turboalternator
[NASA-CR-2113] N72-32495
FOKKER-PLANCK EQUATION
Analytic solution to complete Fokker-Planck equation of solar particle events based on OGO-F data
[NASA-CR-128295] N72-32777
FORBUSH DECREASES
Forbush decreases and cosmic ray intensity variations due to azimuthal asymmetry in solar wind
[KFKI-71-79] N72-32788
FORCE DISTRIBUTION
Normal forces and center of pressure positions for thin flat plates
[ESDU-70015] N72-32295
FORECASTING
Forecast of airport activity for major communities in U.S.
N72-32986
FORESTS
Backscattering from moving radar target in forested areas
[AD-744049] N72-32189
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
Automatic identification of forest and agriculture cover types utilizing ERTS-1 data of Wabash River Basin
[E72-10118] N72-32368
FORMALDEHYDE
Terminal decontamination of rooms by gaseous formaldehyde
[NASA-TT-F-14544] N72-32087
FORMING TECHNIQUES
Incompressibility equation for determining high speed strain hardening of metal during pressure shaping from specimen test data
[AD-744185] N72-32514
Influence of different processing histories and microstructure on low temperature creep of Ti-Al-Sn
[SCL-RR-720227] N72-32554
FORTRAN
FORTRAN subroutine for atmospheric density and appropriate corrections
[AD-744077] N72-32438
FRACTURING
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336
FRAGMENTATION
Mathematical procedure for calculating fragmentation of meteor bodies in flares
[NASA-TT-F-14456] N72-32823
FRAMING CAMERAS
Diode proximity focused image intensifiers for constructing nanosecond framing cameras to measure fast light source intensity
[LA-4937] N72-32479
FRENCH SPACE PROGRAMS
Profiles of 14 French satellites
[NASA-TT-F-14604] N72-32854
FREQUENCY ANALYZERS
Measurement and phase analysis of vibrations in reciprocating compressors
[TR-7205.582] N72-32456
FREQUENCY DIVISION MULTIPLEXING
Digital filter design for FDM group demultiplexer single channel
[AD-744089] N72-32248
FREQUENCY MODULATION
Broadband FM scheme and modification for TDR satellite
[NASA-CR-130057] N72-32180
Range laws for distance measuring systems using frequency modulation with nonlinear triangular waveform
[AD-744483] N72-32196
Algorithms for reducing real time digital processor for transceiver modulation and demodulation
[AD-744082] N72-32201
FRICTION
Refraction, shoaling, and friction of ocean waves reaching Port Phillip Heads, Australia
N72-32403
Dry friction force effects in gyro gimbal joint of free gyro motion, and Lagrange method for solving equations of motion
[AD-744150] N72-32647
FRICTION FACTOR
Effects of graphite in powder alloy materials on friction and wear properties
[AD-744141] N72-32505
FRICTION REDUCTION
Reduction of turbulent friction by use of elastic coatings
[NASA-TT-F-14601] N72-32304
FUEL CELLS
Hydrazine air fuel cell power generating module capable of 120 watts continuous output
[AD-744477] N72-32078
FUEL SYSTEMS
Lumped mass model of impact between fuel duct and in-vessel fuel handling machine
N72-32879
FUNGI
Fungal induced detrimental changes in human-environmental microflora during 90 day test of advanced regenerative life support system
[NASA-CR-112018] N72-32115
FURLABLE ANTENNAS
Furlable antenna for spacecraft
[NASA-CASE-NPO-11361] N72-32169

G

GADOLINIUM
Gadolinium-hydrogen ion exchange on zirconium phosphate ion exchanger in chloride, sulfate, and phosphate solutions
[NASA-TN-D-7053] N72-32155
GALACTIC RADIATION
Galactic X ray sources
[ASE-3066] N72-32784
GALLIUM ARSENIDES
Current-voltage characteristics under load of p-type GaAs on n-type GaAs substrate prepared by liquid epitaxial growth
[NASA-TT-F-14592] N72-32075
GALLIUM PHOSPHIDES
Preparation of n-type material for high diode efficiency and defects in GaP
[NASA-CR-112111] N72-32719
GAMMA RAYS
Effect of gamma ray irradiation on chromosomes in human blood
[LIB/TRANS-366] N72-32122
GAS ANALYSIS
Chemical ionization mass spectrometry with moist N2 or air as reactant gas
[AD-743453] N72-32163
Absolute radiation intensity of continuum and line emission spectra of shock-heated xenon
[AD-744271] N72-32328
GAS BEARINGS
Equivalent equation to problems of gas lubricated bearings
[AD-744264] N72-32509
Asymptotic solution of problems of gas lubrication for high speed bearings with injection
[AD-744293] N72-32511
Experimental and theoretical determination of pressure distribution in lubricant layer of gas static bearing
[AD-744294] N72-32512
Rotor vibrations from misalignment by resonant phenomena and by stability loss in lubricating layer
[AD-744265] N72-32770
GAS CHROMATOGRAPHY
Estimation of amino acid and protein composition by pyrolysis gas chromatography
[NASA-TT-F-14483] N72-32151
GAS DISCHARGES
Classification of electrical erosion in materials based on electrode contact or gas discharge
[AD-744155] N72-32665
GAS DYNAMICS
Partial differential equations for describing one-dimensional gas dynamics problems
[AD-743579] N72-32322
Course lectures and seminar abstracts on planetary atmosphere dynamics
[PB-208567] N72-32430
Research lectures on planetary atmosphere dynamics
[PB-208568] N72-32431
GAS EXPANSION
Computer program for calculating expansion tube flow quantities for real gas mixtures including comparison of program results with experimental data
[NASA-TN-D-6830] N72-32300
GAS FLOW
Analysis of three dimensional flow separations of supersonic streams flowing around solid cylindrical and circular jet obstructions above flat plate
[JPRS-56959] N72-32305
Numerical analysis of equilibrium flows considering ionization, thermal, and barodiffusuon reactions for arbitrary mixtures with various diffusion properties
[JPRS-57017] N72-32306
Development of method for approximation temperature distribution in plane of symmetry downstream of jet injected normal to uniform crossflow
[NASA-TN-D-6966] N72-32939
GAS IONIZATION
Chemical ionization mass spectrometry with moist N2 or air as reactant gas
[AD-743453] N72-32163
GAS LASERS
Diagnostic techniques for determining fluid flow properties at nozzle exit and in lasing region of supersonic diffusion laser system
[AD-743999] N72-32531
GAS LUBRICANTS
Asymptotic solution of problems of gas lubrication for high speed bearings with injection
[AD-744293] N72-32511
Experimental and theoretical determination of pressure distribution in lubricant layer of gas static bearing
[AD-744294] N72-32512
GAS MIXTURES
Analysis of thermal conductivity and diffusivity near critical point of gases and binary liquids
[NASA-CR-2112] N72-32938
GAS TURBINES
High strength alloy and processing procedure for cast air cooled blades used in gas turbines
[AD-744109] N72-32567
Experimental testing of free rotating vaneless diffuser
[AD-744475] N72-32771
Analysis of operation conditions for gas turbine rotor bearings from results of computer calculations of their thermal regimes
[AD-744297] N72-32772
Two dimensional turbine cascade with boundary layer injection, using existing incompressible boundary layer approximate solutions
[AD-744535] N72-32774

GAS-LIQUID INTERACTIONS
Performance tests of aspirating thermocouple probes designed to measure gas temperature in two-phase gas-liquid system similar to that encountered in jet engine exhaust gas spray cooler
[AD-744513] N72-32484

GASEOUS DIFFUSION
Oxygen diffusion under conditions of cerebral hypoxia
[RAE-LIB-TRANS-1661] N72-32108
Electrochemical method and effect of iron purity on cathodic hydrogen diffusion through iron membrane
[RAE-LIB-TRANS-1667] N72-32150

GASKETS
Bibliographies on seal designs and applications
[AD-744050] N72-32504

GEARS
Scuff resistant properties of steel materials used to finish spur and helical gears
[AD-742655] N72-32503
Load-life model for calculating fatigue life and reliability of helicopter spur gear mesh
[AD-744504] N72-32507

GELATION
Gelification of multifunctional macromolecular system
[NASA-TT-F-14487] N72-32152

GEOCHEMISTRY
Model of lunar accretion consistent with geochemical and geophysical data relevant to lunar thermal evolution
[NASA-CR-125693] N72-32794

GEODESY
Long term scientific forecasting of trends in photogrammetry and geodesy
[AD-744347] N72-32444

GEODETIC SURVEYS
Accuracy of methods of redetermining geodetic grids with damaged points
[JPRS-56024] N72-32392

GEOIDS
Improved descriptions of geoid and geopotential using satellite altimeter data
[NASA-TM-X-66016] N72-32401

GEOLOGICAL FAULTS
Mapping seismically active faults in Alaska using ERTS-1 imagery
[E72-10130] N72-32378

GEOLOGY
Remote sensing of permafrost and geologic hazards in Alaska using ERTS-1
[E72-10060] N72-32333
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372
Utilization of ERTS-1 imagery and data as teaching and research tool in geology
[E72-10131] N72-32379
Application of ERTS-1 imagery to geologic and tectonic mapping of Montana
[E72-10141] N72-32388
Study of quaternary landforms and materials in mid-west and Great Plains using ERTS-1 imagery
[E72-10105] N72-32489

GEOMAGNETISM
Geophysical phenomena in earth atmosphere and solar activity data - Oct. 1971 N72-32396

GEOMETRY
Geometrical analysis of displacements, angles of contact, stresses, and bending moments in radial ball bearing design
[NASA-TT-F-14556] N72-32497

GEOPHYSICS
Oceanography and marine geophysics in Indian and Pacific Oceans
[AD-742342] N72-32423
Ground surveys and instrumentation for automation of measuring processes
[AD-743995] N72-32435
Soviet bloc research in astronomy, meteorology, oceanography, geology, and space science - 5 Sept. 1972
[JPRS-56944] N72-32815
Soviet bloc research in astronomy, meteorology, oceanography, geology, and space science - 14 Sept. 1972
[JPRS-57019] N72-32816
Characteristics of Timation 3 circular polar orbit, and suitability of using laser ranging observations of Timation 3 for studies of earth geodynamics
[NASA-TM-X-66012] N72-32851

GEOPOTENTIAL
Improved descriptions of geoid and geopotential using satellite altimeter data
[NASA-TM-X-66016] N72-32401
Zonal geopotential to degree 21 based on mean orbital elements for 21 satellites
[NASA-TM-X-66039] N72-32402

GEORGIA
Environmental impact statement on proposed extension and widening of existing paved runway at Baxley Municipal Airport, Baxley, Georgia
[PB-206167-F] N72-32271
Environmental impact statement on proposed construction of Dade County Airport, Trenton, Georgia
[PB-205578-F] N72-32272
Environmental impact statement on proposed construction of Jasper-Pickens County Airport, Jasper, Georgia
[PB-204959-F] N72-32273
Utilization of ERTS-1 imagery for forest and range-land inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337

GEOSTROPHIC WIND
Two-level quasi-geostrophic circulation model restricted to interactions between one or two waves in zonal direction and mean flow
[AD-743766] N72-32433

GERIATRICS
Hazards of bed rest as therapeutic measure
[NASA-TT-F-14349] N72-32116

GERMANIUM
Photoluminescence study of germanium using neodymium laser
[AD-743566] N72-32529

GERMANIUM ALLOYS
Lattice thermal conductivity of deformed copper-germanium alloy after annealing
[AD-744127] N72-32738

GERMANY
Facilities description of shock tube laboratory at Aachen, Germany
[AD-741191] N72-32269

GIMBALS
Dry friction force effects in gyro gimbal joint of free gyro motion, and Lagrange method for solving equations of motion
[AD-744150] N72-32647

GLACIERS
Mapping and detection of changes of snow cover on land and glaciers using ERTS-1 imagery
[E72-00103] N72-32356

GLACIOLOGY
Glaciology and volcanology studies of Wrangell Mountains, Alaska
[E72-10129] N72-32377

GLASS
Effect of solarization on lasing properties of glass
[AD-744225] N72-32537
Development of equipment for measuring magneto-optic rotation of ions in variety of glasses
[LA-4921] N72-32573
Raman and X ray spectroscopy of lunar glasses and scanning electron microscopy of lunar fines
[NASA-CR-128534] N72-32805
Rb-Sr isotopic study of 5 Bosumtwi, Ghana, crater glasses and 3 Ivory Coast tektites
[NASA-TT-F-14437] N72-32830

GLOBAL ATMOSPHERIC RESEARCH PROGRAM
Global composition of stratosphere and mesosphere based on sounding rocket observations and satellite remote sensing techniques
[NASA-TM-X-66044] N72-32417

GOVERNMENT PROCUREMENT
Congressional hearings to determine fiscal year 1973 authorization for military procurement, research and development, and personnel strength N72-32963

GOVERNMENTS
Department of Defense environmental quality program
[AD-742107] N72-32442

GRAIN BOUNDARIES
Segregation of impurities to grain boundaries generated by vacancy currents in metals
[AD-744519] N72-32562

GRAINS
Effect of grain size on strength of ceramic materials and comparison with aluminum oxide structures
[AD-744047] N72-32576

GRANULAR MATERIALS
Heat transfer mechanism in heterogeneous fluidized bed of granular material, based on packet theory
[NLL-RTS-7421] N72-32932

GRAPHITE
Mass spectrometric search for polymers in carbon vapors and analysis of graphite vaporization kinetics
[AD-744494] N72-32165
Effects of graphite in powder alloy materials on friction and wear properties
[AD-744141] N72-32505
Conference presentations on design and structural analysis of graphite components
[CONF-701105] N72-32572
Fabrication procedures for filament-wound rocket motor case utilizing high-tensile strength graphite fibers
[NASA-CR-128417] N72-32766
Modulated beam mass spectrometer for studying vaporization/reflection reactions and thermodynamics of graphite material for use on reentry vehicle surfaces
[AD-744493] N72-32953

GRAPHS [CHARTS]
Normalized response curves for 1st and 2nd order systems described by linear differential equations with constant coefficients
[ESDU-69005] N72-32584

GRAVIMETRY
Reduction of gravimetric measurements based on solution of Molodenskiy equation
[AD-741861] N72-32427

GRAVITATION THEORY
Measurement of earth gravity by satellite observations and application of satellite data to various scientific fields
[NASA-TT-F-14546] N72-32399

GRAVITATIONAL CONSTANT
Analysis of error covariance matrices for accuracy in determining gravitational coefficients of Mars gravitational potential function
[NASA-TN-D-6949] N72-32834

GRAVITATIONAL FIELDS
Measurement of earth gravity by satellite observations and application of satellite data to various scientific fields
[NASA-TT-F-14546] N72-32399

GRAVITY ANOMALIES
Measurement of earth gravity by satellite observations and application of satellite data to various scientific fields
[NASA-TT-F-14546] N72-32399

GRAZING
Prediction of ephemeral and perennial range quantity and quality during normal grazing season using ERTS-1 imagery
[E72-10090] N72-32343

GREAT LAKES (NORTH AMERICA)
Evaluation of suspended sediment plumes in Lake Ontario based on ERTS-1 imagery
[E72-10110] N72-32362
Field trip study of intense snowstorms in Ishikari Plain, Japan, and similarities to intense snowstorms in Lake Erie and Lake Ontario areas
[PUBL-142] N72-32609

GREAT PLAINS CORRIDOR (NORTH AMERICA)
Study of quaternary landforms and materials in mid-west and Great Plains using ERTS-1 imagery
[E72-10105] N72-32489

GROUND EFFECT
Effect of proximity of earth surface to aerodynamic coefficients N72-32006

GROUND EFFECT MACHINES
Static load deflection and vertical drop tests of quarter scale model of CC-115 aircraft equipped with air cushion landing system
[AD-743829] N72-32056

GROUND STATE
Vibrational energy distribution of nitrogen molecules in electronic ground state
[AD-743567] N72-32528

GROUND STATIONS
Development and characteristics of seismological station and data processing system in Norway
[AD-740845] N72-32447

GROUP DYNAMICS
Group dynamics and alternative distribution of rewards
[AD-741176] N72-32143

GROUP THEORY
Proof of impossibility theorem for group probability functions
[P-4862] N72-32589

GROUP 4B COMPOUNDS
Magnesiothermic reduction of subgroup 4A and subgroup 5A metals and alloys
[JPRS-57138] N72-32551

GROUP 5B COMPOUNDS
Magnesiothermic reduction of subgroup 4A and subgroup 5A metals and alloys
[JPRS-57138] N72-32551

GULF OF MEXICO
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350

GUST LOADS
Analysis of gust loads on transport aircraft under various flight conditions
[ESDU-69023-AMEND-B] N72-32015

GYROCOMPASSES
Inertial process of multiple position gyrocompassing
[AD-743832] N72-32646

GYROSCOPES
Dry friction force effects in gyro gimbal joint of free gyro motion, and Lagrange method for solving equations of motion
[AD-744150] N72-32647

H

H-53 HELICOPTER
Microwave ILS scanning beam data rate analysis for low visibility approach of H-53 helicopter
[AD-743612] N72-32057

HABITATS
Changes in continental migratory bird habitats studied using ERTS-1 imagery
[E72-00106] N72-32358
Management of wildlife habitat in Alaska using ERTS-1 imagery data
[E72-10115] N72-32366

HADRONS
Alternate formulation of hadronic part of Glashow-Georgi theory of weak and electromagnetic interactions based on three triplet model
[TR-72-022] N72-32674

HAIL
Hailstone diameter distribution and design criteria
[AD-743831] N72-32624

HALL EFFECT
Application of micro-Hall device for determining electrical properties of silicon crystals at low temperatures
[AD-744343] N72-32728

HAND [ANATOMY]
Design and operation of multi-finger automatic mechanical hands for industry
[NASA-TT-F-14554] N72-32493

HARDENING [MATERIALS]
Surface hardening for increasing service life of steel bearings
[AD-744256] N72-32506

HARDWARE
Method for obtaining hardware qualification for flight without using qualification tests
[NASA-CR-123831] N72-32843

HARMONIC OSCILLATORS
Regularization method using differential linear equations with constant coefficients as harmonic oscillators
[NASA-TT-F-14422] N72-32409

HARTREE APPROXIMATION
Brueckner-Hartree-Fock theory generalized to permit calculations for intrinsic states having permanent deformation
[NASA-TM-X-68134] N72-32678

HAZARDS
Hazards of bed rest as therapeutic measure
[NASA-TT-F-14349] N72-32116
Remote sensing of permafrost and geologic hazards in Alaska using ERTS-1
[E72-10060] N72-32333
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336

HEARING
Effect of noise and vibration on hearing and worker ear structures
[NASA-TT-F-14542] N72-32094

HEART DISEASES
Diagnosis of heart disease by hybrid computer from phonocardiogram data
[NASA-TT-F-14588] N72-32114

HEAT BALANCE
Heat balance factors in agricultural soil
[NASA-TT-F-14511] N72-32393
Phenomena in air layer near ground caused by divergence of radiation balance and fluxes due to exchange of sensible and latent heat
[NASA-TT-F-14552] N72-32604

HEAT EXCHANGERS
Numerical analysis for predicting three-dimensional flow patterns in shells of heat exchangers and temperature distributions
[EF/TN/A/48] N72-32944

HEAT OF FORMATION
Partial pressures of C3 molecule, heat of formation, and entropy
[AD-744046] N72-32162

HEAT OF VAPORIZATION
Numerical analysis of stable extinction of condensed systems with respect to critical values of rate of pressure drop in half-closed volume
N72-32941

HEAT PUMPS
Design and development of thermal-mechanical pump for transmitting warming fluid through fluid circuit to control temperature of spacecraft instrumentation
[NASA-CASE-NPO-11417] N72-32498

HEAT SHIELDING
Labor costs and techniques for refurbishment of thermal protection system for space shuttles - summary
[NASA-CR-112123] N72-32847
Sublimation ablation for hypersonic heat shielding device
[NASA-TT-F-14529] N72-32936

HEAT SOURCES
Tissue equivalent human phantoms used to measure radiation dose rate of prototypic plutonium circulatory support heat sources
[BNWL-SA-4121] N72-32123

HEAT TRANSFER
Approximate procedure for calculation of laminar and turbulent compressible boundary layers with heat transfer
[NASA-TT-F-14578] N72-32313
NASTRAN thermal analyzer, general purpose finite element heat transfer computer program
N72-32897
Heat transfer mechanism in heterogeneous fluidized bed of granular material, based on packet theory
[NLL-RTS-7421] N72-32932
Design of active cooling scheme with discrete cooling passages and measurement of heat transfer distribution on convective cooled surface
[NASA-CR-112047] N72-32933
Infrared measurement of heat transfer in hypersonic flight structures during wind tunnel investigation
[NASA-TT-F-14509] N72-32934
Analysis of heat transfer characteristics of three air cooled vanes in turbojet engine using impingement cooling, film cooling, and convection cooling
[NASA-TM-X-2580] N72-32949
Heat transfer characteristics of air jets impinging on concave side of right circular semicylinder
[NASA-TM-X-2657] N72-32950

HEAT TRANSFER COEFFICIENTS
Numerical analysis of drag and heat transfer coefficients for meteor bodies during atmospheric entry
[NASA-TT-F-14491] N72-32837

HEAT TREATMENT
Inhibition of thermal discoloration of polyacrylonitrile between 120 and 200 C by maleic acid and maleic imide
[RAE-LIB-TRANS-1593-[A]-PT-1]
N72-32146
Inhibition mechanism of thermal discoloration of polyacrylonitrile by maleic imide supported by solubility studies
[RAE-LIB-TRANS-1593-[B]-PT-2]
N72-32147
Influence of various thermomechanical treatments on creep behavior and time-to-rupture of stainless steel
[KFK-1512] N72-32552

HEATING
Vibrations of thin, closed, circular, cylindrical shell during sudden heating
[AD-744253] N72-32929
Thermal stresses in infinite, elastic, orthotropic cylinder under axisymmetric heating
[NASA-TT-F-14528] N72-32943

HELICOPTER PERFORMANCE
In flight monitoring system to measure and record helicopter performance in real time for all six degrees of freedom
[AD-745118] N72-32476

HELICOPTERS
Effect of maneuvers and flight conditions on helicopter pilot eye movements
[AD-742276] N72-32130
Load-life model for calculating fatigue life and reliability of helicopter spur gear mesh
[AD-744504] N72-32507

HELIUM
Free piston compressor for high pressure He, Na line broadening, and Fe I oscillator strength
[AD-744311] N72-32167
Stellar evolution and core contraction after central helium burning for star of 5 solar masses
[NASA-TT-F-14452] N72-32838

HELIUM-NEON LASERS
Measurement of surface displacement, surface vibration, and random surface movement using helium-neon laser holographic interferometry
[ARL/INST-76] N72-32517

HEMODYNAMIC RESPONSES
Effect of space flight on changes in blood composition and body functions
[NASA-TT-F-14535] N72-32139

HIGH ALTITUDE
High altitude wind and temperature measurement data from meteorological sounding rockets, and radiosonde observations - Dec. 1970
N72-32603

HIGH ALTITUDE BALLOONS
Jungfraujoch and high altitude balloon observations of solar spectra and cold stars
[AD-744087] N72-32445

HIGH ENERGY ELECTRONS
Model for calculation of synchrotron emission from high energy electrons in planetary Van Allen belts
[NASA-TM-X-66015] N72-32781

HIGH ENERGY INTERACTIONS
Solid state, plasma, and high energy research
[NP-19250] N72-32685

HIGH FREQUENCIES
Array method for reducing ground losses in high frequency antenna communication system
[AD-744469] N72-32247

HIGH SPEED CAMERAS
Diode proximity focused image intensifiers for constructing nanosecond framing cameras to measure fast light source intensity
[LA-4937] N72-32479

HIGH STRENGTH ALLOYS
High strength alloy and processing procedure for cast air cooled blades used in gas turbines
[AD-744109] N72-32567

HIGH TEMPERATURE
Effect of fast neutron irradiation on ductility of austenitic stainless steel at low and high temperatures
[CONF-720420-4] N72-32555

HIGH TEMPERATURE ENVIRONMENTS
Electrochemical measurement of corrosion rates of carbon steel, stainless steel, and Zircaloy 2 operating in high temperature environments
[STU-70-394/U-325] N72-32158
Post-aging embrittlement of T-111 tantalum alloy exposed to high temperature environments
[NASA-TN-D-6988] N72-32549

HIGH VOLTAGES
Design of high voltage pulse generator based on circuit for forming trapezoidal shaped pulses
[AD-744154] N72-32481

HIGHWAYS
Development of land use-peak runoff classification system for highway engineering purposes in Maine using ERTS-1 imagery
[E72-10088] N72-32341

HOLDERS
Specimen holder with vertical oscillation and rotation for determining preferred orientation in metals by X ray diffraction
[ARL/MET-81] N72-32468

HOLOGRAPHY
Experimental technique for measuring in-plane displacements by holographic interferometry
[AD-744490] N72-32483
Measurement of surface displacement, surface vibration, and random surface movement using helium-neon laser holographic interferometry
[ARL/INST-76] N72-32517
Use of holography as tool in various laboratory investigative procedures
[SC-DC-721230] N72-32524
Microwave holography as diagnostic method for radomes, antennas, and wave propagation
[AD-744072] N72-32526

HONEST JOHN ROCKET VEHICLE
Meteorological and ballistics data for launch of Honest John rocket vehicle 141
[AD-743839] N72-32618
Meteorological and ballistics data for launch of Honest John missile launch 352
[AD-743840] N72-32619
Meteorological and ballistics data for launching 03702 Honest John Missile Number 1624 Round 623 AML
[AD-743841] N72-32620

HORN ANTENNAS
Gain measurement of horn antenna using pattern integration and near-field gain correction evaluation
[NASA-CR-128299] N72-32232

HOT-WIRE FLOWMETERS
Sensitivity of hot-wire anemothermometers used to analyze turbulence of supersonic flows
[NASA-TT-F-14458] N72-32475

HUMAN BEINGS
Mechanical compression strength of vertebrae and intervertebral disks in humans
[NASA-TT-F-14566] N72-32101

HUMAN BODY
Effect of impact angular acceleration on human body under emergency conditions-aircraft ejection
[NASA-TT-F-14565] N72-32100
Intraperitoneal administration of physiological solution as alternative method for hydrating human body
[NASA-TT-F-14574] N72-32103
Stabilograph for stability determination of stance and fine adjustments to body equilibrium
[AD-741265] N72-32128

HUMAN FACTORS ENGINEERING
Development of schematic representation of pilot workload and functions for various portions of aircraft flight and reaction to various stimuli
N72-32035
Detailed examination of human engineering design standard MSFC-STD-267A for manned spacecraft design and recommendations for improvement of standard for future missions
[NASA-CR-61393] N72-32846

HUMAN PERFORMANCE
Effect of caffeine on athletic performance in 100 yard dash
[NASA-TT-F-14561] N72-32098
Human endurance of impact overloads and mechanical stresses in human body
[NASA-TT-F-14571] N72-32102
Performance of subjects with different cognitive complexity during negotiation in bilateral mode, with mediation, and in presence of observer
[NASA-TT-F-14482] N72-32110
Recovery function in man after continuous military operations
[AD-741828] N72-32125
Effect of schedule control and sleep deprivation on human eye movement behavior
[AD-741397] N72-32134

HUMAN REACTIONS
Effects of prolonged wideband noise on functional condition of human organism
[NASA-TT-F-14567] N72-32088
HURRICANES
Hurricane Emergency Preparedness Plan for FEC at KSC
[NASA-TM-X-68615] N72-32605
HYBRID COMPUTERS
Diagnosis of heart disease by hybrid computer from phonocardiogram data
[NASA-TT-F-14588] N72-32114
Hybrid coding system study, including efficiency improvement and ratio of bit energy-to-noise density
[NASA-CR-114486] N72-32206
HYDRATION
Intraperitoneal administration of physiological solution as alternative method for hydrating human body
[NASA-TT-F-14574] N72-32103
HYDRAULIC EQUIPMENT
Hydraulic research projects conducted at educational institute during fifty year period
[BULL-44] N72-32265
HYDRAULIC FLUIDS
Properties of two high temperature hydraulic fluids under shear and thermal stress conditions
[AD-744106] N72-32582
HYDRAULIC TEST TUNNELS
Development of techniques for visualization of water flow in water tunnel installation
[ARL/A-NOTE-335] N72-32309
HYDRAULICS
Hydraulic research projects conducted at educational institute during fifty year period
[BULL-44] N72-32265
HYDRAZINES
Hydrazine air fuel cell power generating module capable of 120 watts continuous output
[AD-744477] N72-32078
HYDRODYNAMIC EQUATIONS
Hydrodynamic equations for unstable internal waves in viscous fluid
[AD-744512] N72-32327
HYDRODYNAMICS
Optimum hydrodynamic configurations for submerged minimum drag axisymmetric vehicles in incompressible fluids
[AD-744314] N72-32330
HYDROGEN
Electrochemical method and effect of iron purity on cathodic hydrogen diffusion through iron membrane
[RAE-LIB-TRANS-1667] N72-32150
Quantum mechanics and high pressure experiments on hydrogen molecule interaction
[UCRL-73846] N72-32159
Analysis of hydrogen embrittlement of steel electrolytically plated by zinc cyanide process
[RAE-LIB-TRANS-1644-PT-2] N72-32496
Formation of interstellar diatomic molecules by reactions between atoms and ions of interstellar medium and vibrationally excited molecular hydrogen
[NASA-TM-X-66056] N72-32839
HYDROGEN IONS
Gadolinium-hydrogen ion exchange on zirconium phosphate ion exchanger in chloride, sulfate, and phosphate solutions
[NASA-TN-D-7053] N72-32155
HYDROGEOLOGY
Infrared aerial photography for hydrogeological analysis
[NASA-TT-F-14461] N72-32406
HYDROLOGY
Preparation of hydrologic atlases of arid land watersheds based on ERTS-1 imagery
[E72-10113] N72-32364
HYDROXIDES
Magnetic properties of nickel hydroxides
[NASA-TT-F-14448] N72-32157
HYPERBARIC CHAMBERS
Data systems for studying hyperbaric physiology of human and animal subjects
[AD-744053] N72-32129
HYPERONS
Asymptotic algebraic realization of SU[3] in chiral charge algebra and derivation of D/F ratio of hyperon axial vector semileptonic couplings and [g sub A][0]
[TR-72-065] N72-32671
HYPERSONIC AIRCRAFT
Aerodynamics and hypersonic inviscid flow
N72-31995
Optimization methods for determining aerodynamic shapes of hypersonic transport vehicles
N72-31996
Aerodynamic drag and hypersonic aircraft propulsion
N72-32000
Statoreactors for hypersonic aircraft, satellite launch vehicles, and missiles
N72-32752
HYPERSONIC FLOW
Aerodynamics and hypersonic inviscid flow
N72-31995
Analysis of inviscid asymmetric hypersonic flow fields enveloping smooth bodies of general shape
[NASA-CR-2123] N72-32297
Characteristics of initial development of turbulent free mixing layer for hypersonic speeds and profile data downstream of exit of hypersonic nozzle
[NASA-TM-X-2602] N72-32318
Hypersonic nonviscous flow about thin three dimensional body of triangular wing shape
[AD-744143] N72-32325
HYPERSONIC NOZZLES
Characteristics of initial development of turbulent free mixing layer for hypersonic speeds and profile data downstream of exit of hypersonic nozzle
[NASA-TM-X-2602] N72-32318
HYPERSONIC REENTRY
Mathematical models for determining viscous interaction effects on sharp leading edges and blunt bodies during reentry at supersonic and hypersonic speeds
N72-32004
HYPERSONIC SPEED
Sublimation ablation for hypersonic heat shielding device
[NASA-TT-F-14529] N72-32936
HYPERSONIC VEHICLES
Aerodynamic problems of designing optimum hypersonic vehicles
[AGARD-LS-42-VOL-1] N72-31994
Effects of aerodynamic heating and flow patterns on hypersonic vehicle reentry
N72-32001
Procedures for designing hypersonic lifting vehicles
N72-32002
Propulsion of hypersonic vehicles
[AGARD-LS-42-VOL-2] N72-32749
Propulsion mode for hypersonic vehicles
N72-32750
Infrared measurement of heat transfer in hypersonic flight structures during wind tunnel investigation
[NASA-TT-F-14509] N72-32934
HYPERSONICS
Waverider prediction of hypersonic behavior of wing planforms
N72-31997
HYPERVELOCITY WIND TUNNELS
Dynamic stability measurement in wind tunnel of lifting body configurations at hypersonic speeds
[AU-648-PT-4] N72-32039
Infrared measurement of heat transfer in hypersonic flight structures during wind tunnel investigation
[NASA-TT-F-14509] N72-32934
HYPOBARIC ATMOSPHERES
Effects of posture on decompression and hypoxic stress recovery induced by emergency descent of high altitude/multi-Mach transport aircraft
[AD-741686] N72-32131
HYPOXIA
Oxygen diffusion under conditions of cerebral hypoxia
[RAE-LIB-TRANS-1661] N72-32108
Effects of posture on decompression and hypoxic stress recovery induced by emergency descent of high altitude/multi-Mach transport aircraft
[AD-741686] N72-32131
HYSTERESIS
Procedures for determining iron losses in magnetic laminations and measurement of radial airgap inductions in rotating electrical machines
[AD-743591] N72-32077

I

ICE
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381
Study of ice break-up characteristics in Chena River Basin using ERTS-1 imagery
[E72-10135] N72-32383
Model of character and growth of stratiform cloud containing water in gas, liquid, and ice phases and of purely crystalline cloud
[NLL-RTS-7061] N72-32602
Quantitative spectra of atmospheric ice and absorptivity coefficients for ice and liquid water
[AD-743445] N72-32631
ICEBERGS
Iceberg classification using side-looking airborne radar
[AD-742653] N72-32425
ICELAND
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334
IDENTIFYING
Identification criteria for linear dynamic systems with and without noise
[NASA-CR-128173] N72-32257
ILLUMINANCE
Basic components of opto-electronic image recording systems, using night sky illumination
[AD-744056] N72-32240
IMAGE ENHANCEMENT
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
IMAGE INTENSIFIERS
Design and evaluation of photoconductive-electroluminescent image intensifier screen
[AD-743956] N72-32243
Diode proximity focused image intensifiers for constructing nanosecond framing cameras to measure fast light source intensity
[LA-4937] N72-32479
IMAGERY
Multisensor data base for research and development
[AD-744088] N72-32195
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
Studies of inner shelf and coastal sedimentation environment of Beaufort Sea using ERTS-1 imagery
[E72-10062] N72-32335
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
Structural and lithologic study of Northern Coast Range and Sacramento Valley, California using ERTS-1 imagery
[E72-10074] N72-32338
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
Automatic data processing techniques for interdisciplinary analysis of ERTS-1 imagery data for Colorado mountain environments
[E72-10081] N72-32340
Development of land use-peak runoff classification system for highway engineering purposes in Maine using ERTS-1 imagery
[E72-10088] N72-32341
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342
Application of remotely sensed ERTS-1 imagery to selected reclamation projects
[E72-10091] N72-32344
Cartographic applications of ERTS-1 return beam vidicon imagery
[E72-10092] N72-32345
Thematic mapping based on ERTS-1 return beam vidicon imagery
[E72-10094] N72-32347
Evaluation of mineral resources based on ERTS-1 identification of continental crust geostructures
[E72-10095] N72-32348
Extraction of basin characteristics from ERTS-1 imagery for improving regression estimates of streamflow
[E72-10096] N72-32349
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350
Man-made culture interpretation and culture revision of small-scale maps using ERTS-1 multispectral imagery
[E72-10098] N72-32351
Cartographic evaluation of ERTS-1 orbit and attitude data based on return beam vidicon data
[E72-10100] N72-32353
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
Mapping in polar regions using ERTS-1 return beam vidicon imagery
[E72-10102] N72-32355
Mapping and detection of changes of snow cover on land and glaciers using ERTS-1 imagery
[E72-10103] N72-32356
Evaluation of ERTS-1 data applications to present status inventory of post-1890 A.D. episode of accelerated erosion and monitoring future erosional changes to Arizona Ecological Test Site
[E72-10104] N72-32357
Changes in continental migratory bird habitats studied using ERTS-1 imagery
[E72-10106] N72-32358
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359
Photomapping of US using ERTS-1 return beam vidicon imagery
[E72-10108] N72-32360
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361

Evaluation of suspended sediment plumes in Lake Ontario based on ERTS-1 imagery
[E72-10110] N72-32362
Absorption band analysis of ERTS-1 data for discrimination of iron-rich zones
[E72-10111] N72-32363
Preparation of hydrologic atlases of arid land watersheds based on ERTS-1 imagery
[E72-10113] N72-32364
Density and distribution of phreatophytes and other arid land plant communities studied using ERTS-1 imagery
[E72-10114] N72-32365
Management of wildlife habitat in Alaska using ERTS-1 imagery data
[E72-10115] N72-32366
Timber resource inventory of Washington State using ERTS-1 imagery
[E72-10116] N72-32367
Automatic identification of forest and agriculture cover types utilizing ERTS-1 data of Wabash River Basin
[E72-10118] N72-32368
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369
Identification of coastal vegetation species in Delaware using ERTS-1 imagery
[E72-10120] N72-32370
Analysis of interdependence of lake ice and climate in Central North America using ERTS-1 imagery
[E72-10121] N72-32371
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372
Monitoring of reservoirs and water resources in Kansas using ERTS-1 imagery
[E72-10123] N72-32373
Evaluation of effect of water stress, disease and leaf area on reflectance characteristics, production, and prediction of disease severity and economic loss of wheat using ERTS-1 imagery
[E72-10126] N72-32374
Utilization of ERTS-1 imagery as data sources for Kansas agricultural statistics
[E72-10127] N72-32375
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376
Glaciology and volcanology studies of Wrangell Mountains, Alaska
[E72-10129] N72-32377
Mapping seismically active faults in Alaska using ERTS-1 imagery
[E72-10130] N72-32378
Utilization of ERTS-1 imagery and data as teaching and research tool in geology
[E72-10131] N72-32379
ERTS-1 imagery of water currents and circulation in Prince William Sound
[E72-10132] N72-32380
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381
Study of caribou movements and winter dispersal in Alaska in relation to prevailing snow cover using ERTS-1 imagery
[E72-10134] N72-32382
Study of ice break-up characteristics in Chena River Basin using ERTS-1 imagery
[E72-10135] N72-32383
Survey of seasonal snow cover in Alaska based on ERTS-1 imagery
[E72-10136] N72-32384
Identification, definition, and mapping of terrestrial ecosystems in interior Alaska using ERTS-1 imagery
[E72-10137] N72-32385
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
Analysis of ERTS-1 multispectral data and imagery of northwest Saudi Arabia
[E72-10140] N72-32387
Application of ERTS-1 imagery to geologic and tectonic mapping of Montana
[E72-10141] N72-32388
Identification of Delaware coastal vegetation species in ERTS-1 imagery
[E72-10142] N72-32389
Extraction of textural features of selected frames of ERTS-1 imagery as basis for discrimination between types of categories of interest to ERTS investigators at Kansas
[E72-10124] N72-32453
Study of quaternary landforms and materials in mid-west and Great Plains using ERTS-1 imagery
[E72-10105] N72-32489

IMAGES
Stellar image perturbation caused by earth atmospheric temperature heterogeneities and wind speeds, and stellar image jitter amplitude measurement
[AD-744172] N72-32841

IMIDES
Inhibition of thermal discoloration of polyacrylonitrile between 120 and 200 C by maleic acid and maleic imide
[RAE-LIB-TRANS-1593-[A]-PT-1] N72-32146
Inhibition mechanism of thermal discoloration of polyacrylonitrile by maleic imide supported by solubility studies
[RAE-LIB-TRANS-1593-[B]-PT-2] N72-32147

IMMUNITY
Lymphoblastic transformation test for studying immunity of pregnant women
[NASA-TT-F-14591] N72-32106

IMP
Designs and modifications of MED and LED encoding circuitry for IMP H and J spacecraft
[NASA-TM-X-66030] N72-32226

IMPACT
Cavitation erosion of rigid surfaces on impact with drops
[RAE-LIB-TRANS-1655] N72-32298
Lumped mass model of impact between fuel duct and in-vessel fuel handling machine N72-32879

IMPACT DAMAGE
Effect of droplet impacts on blades of wet steam turbines and resistance of materials to erosion based on number of load cycles and energy capacity of material before fracture
[RAE-LIB-TRANS-1654] N72-32307
Development of equation for determining pressure of spherical drop colliding at right angles with plane rigid surface
[RAE-LIB-TRANS-1652] N72-32308

IMPACT LOADS
Human endurance of impact overloads and mechanical stresses in human body
[NASA-TT-F-14571] N72-32102
Estimating impact pressure of drop with solid surface, deformation of drop surface, and onset of post-collisional motion of liquid
[RAE-LIB-TRANS-1653] N72-32299
Effect of droplet impacts on blades of wet steam turbines and resistance of materials to erosion based on number of load cycles and energy capacity of material before fracture
[RAE-LIB-TRANS-1654] N72-32307
Development of equation for determining pressure of spherical drop colliding at right angles with plane rigid surface
[RAE-LIB-TRANS-1652] N72-32308

IMPACT TESTS
Use of profilograph recordings and microphotographs to determine single traces of impact and product of wear in abrasive erosion
[NLL-RTS-7374] N72-32488
Full scale model impact tests to define emergency landing capability of Apollo command modules
[NASA-TN-D-6979] N72-32857
Testing metals for tension, impact and variable loads
[JPRS-57075] N72-32912

IMPACT TOLERANCES
Effect of impact angular acceleration on human body under emergency conditions-aircraft ejection
[NASA-TT-F-14565] N72-32100

IMPURITIES
Segregation of impurities to grain boundaries generated by vacancy currents in metals
[AD-744519] N72-32562

INCIDENT RADIATION
Design of instrument based on Ulbrichts sphere for measuring UV radiation incident at arbitary angles
[NASA-TT-F-14416] N72-32470
Instrument with spherical attachment for measuring UV radiation at large incident angles
[NASA-TT-F-14418] N72-32471

INCOHERENT SCATTERING
Energizing discharge lamps with trigger circuit for high intensity, incoherent light source
[NASA-CASE-XLE-2529-3] N72-32229

INCOMPRESSIBLE FLOW
Axisymmetric incompressible fluid flows in rotational tank with abrupt change in angular speed of cover
[AD-744238] N72-32331

INCOMPRESSIBLE FLUIDS
Nonlinear theory of lifting surfaces applied to problem of forces acting on rectangular wing in stream of incompressible fluid N72-32008
Two dimensional motion of incompressible fluid bounded by flexible film
[NASA-TT-F-14575] N72-32312

Optimum hydrodynamic configurations for submerged minimum drag axisymmetric vehicles in incompressible fluids
[AD-744314] N72-32330

INDEXES [DOCUMENTATION]
Annotated bibliography and indexes on Aerospace Medicine and Biology - June 1972
[NASA-SP-7011[104]] N72-32080
National Bureau of Standards publication of Standard Reference Materials Price and Availability List for January 1972
[NBS-SP-360] N72-32569
Indexes and summaries of conference papers on cesium diode performance
[NASA-TM-X-2589] N72-32650

INDIAN OCEAN
Oceanography and marine geophysics in Indian and Pacific Oceans
[AD-742342] N72-32423

INDIUM ARSENIDES
Two photon production of electron hole plasma by absorption of CO2 laser light in InSb
[AD-744131] N72-32731

INDUSTRIES
Application of human-like teleoperator machine and robots to various industrial tasks
[NASA-TT-F-14553] N72-32492
Design and operation of multi-finger automatic mechanical hands for industry
[NASA-TT-F-14554] N72-32493

INERTIAL GUIDANCE
Inertial process of multiple position gyrocompassing
[AD-743832] N72-32646

INFORMATION RETRIEVAL
Linguistic interactions and logic applied to models of cognition, education, and information retrieval
[AD-744009] N72-32144
Computer terminals for information retrieval and computer communication controller and software interfaces
[TR-126] N72-32204

INFORMATION SYSTEMS
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342

INFORMATION THEORY
Development of schematic representation of pilot workload and functions for various portions of aircraft flight and reaction to various stimuli N72-32035
Influence of programming language design on program validation
[P-4865] N72-32210
Digital filter design for FDM group demultiplexer single channel
[AD-744089] N72-32248

INFRARED DETECTORS
Development of theory of infrared sensing system performance based on radiative properties of target and transmissive scattering effects
[NASA-CR-128416] N72-32472

INFRARED FILTERS
Structural design and spectral characteristics of various infrared filters
[JPRS-56916] N72-32653

INFRARED INSTRUMENTS
Infrared measurement of heat transfer in hypersonic flight structures during wind tunnel investigation
[NASA-TT-F-14509] N72-32934

INFRARED LASERS
Nd YAG laser with self compensation of thermally induced stress birefringence
[AD-743979] N72-32525

INFRARED PHOTOGRAPHY
Infrared aerial photography for hydrogeological analysis
[NASA-TT-F-14461] N72-32406

INFRARED RADIATION
Estimation of sea surface temperature from Nimbus 4 measurements in 11-13 micron window region
[NASA-TM-X-66053] N72-32418
Application of color display techniques for analysis of Nimbus infrared radiation data
[NASA-TN-D-6786] N72-32462
Development of theory of infrared sensing system performance based on radiative properties of target and transmissive scattering effects
[NASA-CR-128416] N72-32472
Angular, spectral, and spatial distribution of infrared radiation data in ionosphere from Cosmos 45 data
[NASA-TT-F-14442] N72-32787

INFRARED SCANNERS
Digital processing of IR line-scan video signals collected during 24 hour period of aerial reconnaissance
[AD-744332] N72-32485

INFRARED SPECTRA
Jungfraujoch and high altitude balloon observations of solar spectra and cold stars
[AD-744087] N72-32445
Quantitative spectra of atmospheric ice and absorptivity coefficients for ice and liquid water
[AD-743445] N72-32631

INFRASONIC FREQUENCIES
Infrasonic wave detection applied to seismology, geophysics, underwater communication, storm forecasting, agriculture, medicine, and industrial nondestructive tests
[AD-743828] N72-32663
INHIBITION
PH dependent inhibition and reactivation of angiotensin 2 A and angiotensin 2 H and EDTA angiotensinases inhibition in amide cleaving enzymes of human blood plasma
[NASA-TT-F-14457] N72-32118
INHOMOGENEITY
Continuity equation for radiation transfer theory in nonhomogeneous medium
[NASA-TT-F-14443] N72-32947
INORGANIC COMPOUNDS
Effect of direct application of K, Ca, Mg, and Ba ions on body temperature and sweat secretion
[NASA-TT-F-14545] N72-32095
INPUT/OUTPUT ROUTINES
Development of theory for designing optimal inputs to identify parameters in linear dynamic systems and application to avionics installations - Part 2
[AD-744116] N72-32065
INSTRUMENT COMPENSATION
Background compensated X ray radiometric logging in nuclear geophysical investigations
[NLL-RTS-6739] N72-32451
INSTRUMENT ERRORS
Analysis of instrumentation error effects on identification accuracy of aircraft parameters
[NASA-CR-112121] N72-32040
Digital computer program for investigating effects of instrument error on aircraft stability and control derivatives from flight test data
[NASA-CR-112122] N72-32041
INSTRUMENT FLIGHT RULES
Revisions to handling qualities criteria for V/STOL aircraft with emphasis on instrument flight characteristics
N72-32021
INSTRUMENT LANDING SYSTEMS
Microwave ILS scanning beam data rate analysis for low visibility approach of H-53 helicopter
[AD-743612] N72-32057
INTEGRAL EQUATIONS
Reduction of gravimetric measurements based on solution of Molodenskiy equation
[AD-741861] N72-32427
Integral equation for characteristic oscillations of sheet plasma
[IPPT-132] N72-32694
INTEGRATED CIRCUITS
Design and evaluation of reliable integrated termination devices
[AD-744476] N72-32245
INTELSAT SATELLITES
Mission planning, launch, communication, and testing of Intelsat 4 spacecraft
[NASA-TM-X-68626] N72-32818
INTERFEROMETERS
Tracking ATS 3 by very long baseline interferometer observations
[NASA-TM-X-66018] N72-32263
INTERFEROMETRY
Ionospheric disturbances and long baseline interferometry
[AD-743950] N72-32434
Quality control of scatter plates for interferometric measurement of surface configurations of telescope mirrors and other optical components
[NASA-TM-X-64691] N72-32473
Experimental technique for measuring in-plane displacements by holographic interferometry
[AD-744490] N72-32483
Measurement of surface displacement, surface vibration, and random surface movement using helium-neon laser holographic interferometry
[ARL/INST-76] N72-32517
INTERMITTENCY HYPOTHESIS
Analysis of photographic intermittency effect and explanation of inconsistencies in photographic images
[RAE-LIB-TRANS-1595] N72-32461
INTERNATIONAL COOPERATION
Polish space program activities, and medical and biocybernetics research in Albania and Poland
[JPRS-56928] N72-32814
COSPAR activities in space research
N72-32959
Congressional hearings on international agreement between USSR and US on peaceful use of space
N72-32961
INTERNATIONAL LAW
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - general findings and studies on international law, water resources management, and recreation
[NASA-CR-127335] N72-32974
INTERNATIONAL SYSTEM OF UNITS
Definitions, symbols, and recommended usage of International System of Units [SI]
[NBS-SP-330-1972] N72-32968
INTERPLANETARY MAGNETIC FIELDS
Interplanetary magnetic field power spectrum and cosmic ray diffusion
[NASA-TM-X-66019] N72-32782
INTERSTELLAR RADIATION
Interstellar reddening law in far ultraviolet determined from OAO 2 satellite filter photometry
[NASA-TM-X-66055] N72-32840
INTERSTELLAR SPACE
Formation of interstellar diatomic molecules by reactions between atoms and ions of interstellar medium and vibrationally excited molecular hydrogen
[NASA-TM-X-66056] N72-32839
INTERVERTEBRAL DISKS
Mechanical compression strength of vertebrae and intervertebral disks in humans
[NASA-TT-F-14566] N72-32101
INTOXICATION
Graf driving machine for determining sobering effect of caffeine and pervitin on intoxicated individual
[NASA-TT-F-14564] N72-32099
INVENTORIES
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
INVISCID FLOW
Lift curve slope and aerodynamic center position of wings in inviscid supersonic and subsonic flow
[ESDU-70012] N72-31990
Aerodynamics and hypersonic inviscid flow
N72-31995
Analysis of inviscid asymmetric hypersonic flow fields enveloping smooth bodies of general shape
[NASA-CR-2123] N72-32297
ION BEAMS
Ion beamlets of predetermined configurations formed in screen grid of ion thruster
[NASA-CASE-LEW-11646-1] N72-32760
ION DISTRIBUTION
Development of equipment for measuring magneto-optic rotation of ions in variety of glasses
[LA-4921] N72-32573
ION ENGINES
Ion beamlets of predetermined configurations formed in screen grid of ion thruster
[NASA-CASE-LEW-11646-1] N72-32760
ION EXCHANGE MEMBRANE ELECTROLYTES
Electrochemical method and effect of iron purity on cathodic hydrogen diffusion through iron membrane
[RAE-LIB-TRANS-1667] N72-32150
ION EXCHANGING
Gadolinium-hydrogen ion exchange on zirconium phosphate ion exchanger in chloride, sulfate, and phosphate solutions
[NASA-TN-D-7053] N72-32155
ION SOURCES
Q switched laser beam as ion source for pulsed neutron generator
[CEA-R-4273] N72-32523
ION TEMPERATURE
Analysis of ion heating mechanism in modified Penning discharge
[NASA-TN-D-6985] N72-32695
IONIZATION GAGES
Energy calibration of cosmic ray ionization spectrometer using protons and pions from 9.3 GeV to 17.6 GeV
[NASA-TM-X-66037] N72-32463
IONIZED GASES
Asymptotic series analysis of interaction between electrostatic probe and weakly ionized plasma
[AD-744100] N72-32710
IONIZING RADIATION
Effect of ionizing radiation on field effect transistors
[AD-744093] N72-32732
IONOSPHERE
Parametric processes and combination scattering of electromagnetic waves on plasmons in turbulent plasma excited by flux of charged particles in polar ionosphere
[NASA-TT-F-14589] N72-32414
Potential double layer sheaths in upper ionosphere
[TRITA-EPP-71-14] N72-32420
Angular, spectral, and spatial distribution of infrared radiation data in ionosphere from Cosmos 45 data
[NASA-TT-F-14442] N72-32787
IONOSPHERIC DISTURBANCES
Ionospheric disturbances and long baseline interferometry
[AD-743950] N72-32434
Meteorological synoptic analyses in stratosphere and lower mesosphere and F min values over North America
[AD-744470] N72-32437
IONOSPHERIC HEATING
Ionospheric heating analysis with determination of HF plasma line enhancements
[AD-744523] N72-32446
IONOSPHERIC ION DENSITY
Concentration of NO2 ions in lower ionosphere determined with rocket-borne, quadrupole ion mass spectrometer
[NASA-TM-X-66024] N72-32395
IONOSPHERIC PROPAGATION
Formulas for excitation of earth ionosphere waveguide by vertical electric Hertzian dipole
[AD-744241] N72-32197
IONS
Formation of interstellar diatomic molecules by reactions between atoms and ions of interstellar medium and vibrationally excited molecular hydrogen
[NASA-TM-X-66056] N72-32839
IOWA
Environmental impact statement of proposal for installation of instrument landing system and approach lighting system at Ottumwa Industrial Airport, Ottumwa, Iowa
[PB-207235-F] N72-32275
IRAN
Utilization of ERTS-1 photography for evaluation of Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352
IRON
Electrochemical method and effect of iron purity on cathodic hydrogen diffusion through iron membrane
[RAE-LIB-TRANS-1667] N72-32150
Free piston compressor for high pressure He, Na line broadening, and Fe I oscillator strength
[AD-744311] N72-32167
Ultrasonic inspection of weldments in cast iron cylinder
[TR-7206.587] N72-32545
Ultrasonic thickness measurement of iron panels for phenol cracking
[TR-7206.586] N72-32546
IRON ALLOYS
Viscosity properties based on X ray diffraction data for iron carbon melts with nickel and tungsten additives
[AD-744263] N72-32563
Viscosity, density, and surface energy of molten alloys of iron and silicon
[AD-744255] N72-32566
IRON ORES
Absorption band analysis of ERTS-1 data for discrimination of iron-rich zones
[E72-10111] N72-32363
ISOTROPISM
Hydrodynamic description of plasma based on rapid isotropization of arbitrary particle distribution in case where no macromotion exists
[NASA-TT-F-14599] N72-32696

J

JACOBI INTEGRAL
Ten place tables of Jacobian elliptic functions as aid for design and analysis of ultrasharp elliptic filters
[AD-741781] N72-32594
JAPAN
Field trip study of intense snowstorms in Ishikari Plain, Japan, and similarities to intense snowstorms in Lake Erie and Lake Ontario areas
[PUBL-142] N72-32609
Summary of synoptic meteorological observations of Japanese coastal marine areas including Central East China Sea, Northern East China Sea, and Nagasaki
[AD-743488] N72-32614
JET AIRCRAFT
Aerodynamic characteristics and performance of Russian M-4 supersonic long range aircraft
[AD-744159] N72-32051
JET ENGINES
Concept for jet noise suppression for afterburning turbojet engine
[NASA-TM-X-68144] N72-32763
JET MIXING FLOW
Development of method for approximation temperature distribution in plane of symmetry downstream of jet injected normal to uniform cross-flow
[NASA-TN-D-6966] N72-32939
JET PROPULSION
Methods for thrust determination in aircraft
[RAE-LIB-TRANS-1650] N72-32755
JET THRUST
Thruster development effort of biowaste resistojet program
[NASA-CR-112150] N72-32761
JUPITER (PLANET)
Measurement of shock waves and flux velocity of Jupiter solar wind during minimum activity
[NASA-TT-F-14470] N72-32821
JUPITER ATMOSPHERE
Design studies for X ray experiment using solid state detectors or proportional counter for exploring magnetospheres of Saturn and Jupiter and cosmic X ray sources
[NASA-CR-128250] N72-32455

K

KANSAS
Interpretation and automatic image enhancement digital data processing facility for ERTS-1 imagery of Kansas
[E72-10125] N72-32203
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372
Monitoring of reservoirs and water resources in Kansas using ERTS-1 imagery
[E72-10123] N72-32373
Utilization of ERTS-1 imagery as data sources for Kansas agricultural statistics
[E72-10127] N72-32375
Extraction of textural features of selected frames of ERTS-1 imagery as basis for discrimination between types of categories of interest to ERTS investigators at Kansas
[E72-10124] N72-32453

KINEMATICS
Geometric and kinematic properties of isoparametric quadrilateral membrane element for NASTRAN
N72-32887

KINETIC EQUATIONS
Models of D region G factor and derivation of energy balance equation for wave interactions
[NASA-CR-130059] N72-32391

KINETIC THEORY
Boltzmann kinetic equations applied to analysis of upper atmospheric properties
[NASA-TT-F-14434] N72-32416

L

LABORATORY EQUIPMENT
Use of holography as tool in various laboratory investigative procedures
[SC-DC-721230] N72-32524

LAKE ICE
Analysis of interdependence of lake ice and climate in Central North America using ERTS-1 imagery
[E72-10121] N72-32371

LAMINAR FLOW
Flow deflection of streamline in conical flow field between shock and surface of right circular cone
[ESDU-7009] N72-32294
Axisymmetric incompressible fluid flows in rotational tank with abrupt change in angular speed of cover
[AD-744238] N72-32331

LAMINATES
Technology and production of laminates, and problems in producing laminated aircraft structures
[AD-742780] N72-32055
Potential of laminar metal-metal composites for use at elevated temperatures
[NASA-TM-X-68056] N72-32541
Development of heat resistant plastics and application to aerospace industry products
[AD-744190] N72-32583

LANCE MISSILE
Meteorological data tables gathered for launching 12808 Lance missile number 2146 round 157 SPL
[AD-743843] N72-32622
Meteorological and ballistics data for launching of 11602 Lance missile 2131 round 156 EST
[AD-743844] N72-32623

LAND MANAGEMENT
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361
Hearings before House Subcommittee on NASA oversight on real estate management and disposal, and excess land declarations at Lewis and Langley Research Centers and Wallops Island
N72-32964

LAND USE
Development of land use-peak runoff classification system for highway engineering purposes in Maine using ERTS-1 imagery
[E72-10088] N72-32341
Land use and management information system for Central Atlantic Region based on ERTS-1 remote sensor data
[E72-10089] N72-32342
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361

LANDFORMS
Study of quaternary landforms and materials in midwest and Great Plains using ERTS-1 imagery
[E72-10105] N72-32489

LANGUAGE PROGRAMMING
Influence of programming language design on program validation
[P-4865] N72-32210
Computer architectural language for designing machines to perform onboard computational functions
[AD-743014] N72-32216

LARMOR PRECESSION
Charged particles with random equally probable phases of rotation about Larmor circle
[KHFTI-71-22] N72-32700

LASER MATERIALS
Efficient optical pumps using xenon lamp with clad erbium silicate glass laser material
[AD-744480] N72-32532

LASER MODES
Development and application of circular piezoelectric bender laser tuner to replace conventional laser tuners
[NASA-TM-X-66040] N72-32515

LASER OUTPUTS
Physiological effects of laser radiation and safety precautions followed during laboratory experiments
[JPRS-57029] N72-32516
Observation of plasma formation and plasma jet shaping during laser action on metals
[NASA-TT-F-14476] N72-32520
Basic experimental parameters associated with using laser speckle correlation fringes to measure in-plane strain
[AD-744489] N72-32533
Calculation of focal spot variance of focused laser beam caused by atmospheric turbulence
[AD-744099] N72-32535
Laser light scattering spectroscopy used for analysis of phase transition phenomena
[AD-744532] N72-32536

LASER RANGE FINDERS
Characteristics of Timation 3 circular polar orbit, and suitability of using laser ranging observations of Timation 3 for studies of earth geodynamics
[NASA-TM-X-66012] N72-32851

LASERS
Production of plasmas by laser spark, and thermonuclear fusion
[NASA-TT-F-14465] N72-32518
Detection sensitivity of nonconductive powder samples in laser emission spectrography
[NASA-TT-F-14478] N72-32519
Laser driven fusion pulses for generating commercial electric power in power plants
[LA-4858-VOL-1] N72-32521
Amplitude and phase variance of optical signal propagating over folded laser path
[AD-743850] N72-32527
Photoluminescence study of germanium using neodymium laser
[AD-743566] N72-32529
Effect of solarization on lasing properties of glass
[AD-744225] N72-32537
Plasma study, using lasers with high frequency stability, narrow beam directivity, and high power
[AD-742639] N72-32708

LAUNCH VEHICLES
Statoreactors for hypersonic aircraft, satellite launch vehicles, and missiles
N72-32752

LAUNCHING BASES
Hearings before House Subcommittee on NASA oversight on real estate management and disposal, and excess land declarations at Lewis and Langley Research Centers and Wallops Island
N72-32964

LEAD SELENIDES
Junction diffusion, interdiffusion, and self diffusion in lead chalcogenides
[AD-743485] N72-32727

LEAD SULFIDES
Junction diffusion, interdiffusion, and self diffusion in lead chalcogenides
[AD-743485] N72-32727

LEAD TELLURIDES
Junction diffusion, interdiffusion, and self diffusion in lead chalcogenides
[AD-743485] N72-32727

LEADING EDGES
Numerical computation of transonic flow around leading edge of wing profile
[NASA-TT-F-14285] N72-32010
Analysis of spanwise distribution leading edge tangential suction forces on thin sixty degree delta wing obtained in low speed wind tunnel
[KTH-AERO-TN-58] N72-32011

LEAVES
Evaluation of effect of water stress, disease and leaf area on reflectance characteristics, production, and prediction of disease severity and economic loss of wheat using ERTS-1 imagery
[E72-10126] N72-32374

LIFT
Lift curve slope and aerodynamic center position of wings in inviscid supersonic and subsonic flow
[ESDU-70012] N72-31990

LIFTING BODIES
Momentum theory for optimum design of wing surfaces
N72-31999
Aerodynamic characteristics of lifting surfaces
[JPRS-57100] N72-32005
Effect of proximity of earth surface to aerodynamic coefficients
N72-32006
Calculating aerodynamic characteristics of lifting systems composed of rectangular wings arranged one behind other
N72-32007
Dynamic stability measurement in wind tunnel of lifting body configurations at hypersonic speeds
[AU-648-PT-4] N72-32039

LIFTING REENTRY VEHICLES
Procedures for designing hypersonic lifting vehicles
N72-32002
Nonequilibrium real gas effects on lifting reentry aerothermodynamics of space shuttle vehicle
N72-32003

LIGHT (VISIBLE RADIATION)
Optical and riometer data from 6 to 10 March 1970 geophysical event
[AD-744074] N72-32439
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550
Colorimetric measurement of visual color and true color in noctilucent clouds
[NASA-TT-F-14460] N72-32822

LIGHT SCATTERING
Light scattered at various angles by transparent media in general purpose, wideband optical spatial frequency, spectrum analyzer
[NASA-CR-128175] N72-32454
Laser light scattering spectroscopy used for analysis of phase transition phenomena
[AD-744532] N72-32536

LIGHT TRANSMISSION
Application of atmospheric contrast transmission to visual detection and electro-optical lock-on problem
[AD-743560] N72-32192

LIGHTNING
Wire dispensers for study of artificial triggering of lightning strokes
[AD-743863] N72-32625

LINE SPECTRA
Free piston compressor for high pressure He, Na line broadening, and Fe I oscillator strength
[AD-744311] N72-32167
Absolute radiation intensity of continuum and line emission spectra of shock-heated xenon
[AD-744271] N72-32328
Ionospheric heating analysis with determination of HF plasma line enhancements
[AD-744523] N72-32446
Theory of Fabry-Perot interferometer with flat mirrors and its use in measuring spectral line contours
[AD-744174] N72-32666

LINEAR ACCELERATORS
Research and development in linear accelerator project
[COO-3058-11] N72-32268

LINEAR EQUATIONS
Linear equations of piezoelectromagnetism for thickness-shear vibrations of quartz plate
[AD-744312] N72-32254
Regularization method using differential linear equations with constant coefficients as harmonic oscillators
[NASA-TT-F-14422] N72-32409
Normalized response curves for 1st and 2nd order systems described by linear differential equations with constant coefficients
[ESDU-69005] N72-32584

LINEAR SYSTEMS
Identification criteria for linear dynamic systems with and without noise
[NASA-CR-128173] N72-32257

LINGUISTICS
Linguistic interactions and logic applied to models of cognition, education, and information retrieval
[AD-744009] N72-32144

LIQUID CRYSTALS
Cholesteric liquid crystals as indicators for qualitative and quantitative thermal analysis
[AD-744211] N72-32198

LIQUID METALS
Temperature dependences of viscosity of pure metals
[AD-741153] N72-32561
Proceedings of conference on solid state physics, fracture mechanics, composite materials, liquid metals, and infrared optical materials - Vol. 1
[AD-744204] N72-32564
Prerequisites and possible mechanisms for occurrence of liquid metal embrittlement
[AD-744531] N72-32568

LIQUID OXYGEN
Design and construction of prototype vent system for exhausting gas to space from all liquid or two phase mixture of oxygen
[NASA-CR-123826] N72-32844
LIQUID PROPELLANT ROCKET ENGINES
Engine firing tests of Centaur launch vehicle to evaluate pressurized propellant feed system
[NASA-TN-D-6876] N72-32856
LIQUID ROCKET PROPELLANTS
Engineering criteria for predicting and preventing flow decay in operational nitrogen tetroxide systems
[AD-744110] N72-32745
Rocket propulsion, liquid propellants, and thermonuclear propulsion systems
N72-32751
LITHIUM
Computing excitation cross sections for neutral atoms and positive ions by electron impact for lithium and sodium isoelectronic series
[NASA-TT-F-14430] N72-32680
LITHOLOGY
Structural and lithologic study of Northern Coast Range and Sacramento Valley, California using ERTS-1 imagery
[E72-10074] N72-32338
LITHOSPHERE
Models of underthrusting lithospheric plates for calculating displacement and deflection
[NASA-TM-X-66028] N72-32397
LOADS [FORCES]
Bending of strut in one plane under combined action of end loads, side load, and end restraining moments
[ESDU-01.01.16] N72-32863
Testing metals for tension, impact and variable loads
[JPRS-57075] N72-32912
LOGIC CIRCUITS
Combinatorial network synthesis and analysis of binary synchronous counting circuits
[AD-744269] N72-32219
LONG TERM EFFECTS
Fungal induced detrimental changes in human-environmental microflora during 90 day test of advanced regenerative life support system
[NASA-CR-112018] N72-32115
LOUDSPEAKERS
Distortion and low frequency signals in loudspeakers
[BBC-1972/25] N72-32170
LOW ASPECT RATIO WINGS
Calculating downwash angles behind wings with small span-chord ratios moving at subsonic speeds using nonlinear algebraic equations
N72-32009
LOW FREQUENCIES
Distortion and low frequency signals in loudspeakers
[BBC-1972/25] N72-32170
LOW SPEED WIND TUNNELS
Analysis of spanwise distribution leading edge tangential suction forces on thin sixty degree delta wing obtained in low speed wind tunnel
[KTH-AERO-TN-58] N72-32011
Modifications of low speed open-circuit wind tunnel to improve airflow characteristics
[AD-743454] N72-32285
LOW TEMPERATURE
Effect of fast neutron irradiation on ductility of austenitic stainless steel at low and high temperatures
[CONF-720420-4] N72-32555
LOW TEMPERATURE PHYSICS
Medium energy physics research, including engineering support, accelerator systems, and electronic instrumentation
[LA-4899] N72-32267
LOW TEMPERATURE TESTS
Gas regenerative cycle of low temperature unit and energy expenditure
N72-32945
LOWER IONOSPHERE
Concentration of NO2 ions in lower ionosphere determined with rocket-borne, quadrupole ion mass spectrometer
[NASA-TM-X-66024] N72-32395
Vertical incidence absorption in lower equatorial ionosphere during solar half-cycle
[NASA-TM-X-66029] N72-32778
LUBRICATION
Equivalent equation to problems of gas lubricated bearings
[AD-744264] N72-32509
LUMINANCE
Cause of meteor flares attributed to passage through atmospheric layers of different density
[NASA-TT-F-14475] N72-32824
LUMINOUS INTENSITY
Effect of various magnesium salts on luminous intensity and duration in phosphorescent bacteria
[NASA-TT-F-14431] N72-32112
Diode proximity focused image intensifiers for constructing nanosecond framing cameras to measure fast light source intensity
[LA-4937] N72-32479
LUNAR COMPOSITION
Mineralogical composition and origin of moon as high temperature condensate from solar nebula
[NASA-CR-128194] N72-32806
LUNAR CRATERS
Formation of lunar craters and mountains
[NASA-TT-F-14474] N72-32820
LUNAR EVOLUTION
Genesis of moon
[NASA-TT-F-14513] N72-32394
Model of lunar accretion consistent with geochemical and geophysical data relevant to lunar thermal evolution
[NASA-CR-125693] N72-32794
Mineralogical composition and origin of moon as high temperature condensate from solar nebula
[NASA-CR-128194] N72-32806
LUNAR GEOLOGY
Mineralogical composition and origin of moon as high temperature condensate from solar nebula
[NASA-CR-128194] N72-32806
Formation of lunar craters and mountains
[NASA-TT-F-14474] N72-32820
LUNAR MODULE
Apollo experience report on design, testing, and development of lunar module electrical power subsystem
[NASA-TN-D-6977] N72-32848
LUNAR SOIL
Raman and X ray spectroscopy of lunar glasses and scanning electron microscopy of lunar fines
[NASA-CR-128534] N72-32805
LUNAR TEMPERATURE
Model of lunar accretion consistent with geochemical and geophysical data relevant to lunar thermal evolution
[NASA-CR-125693] N72-32794
LYMPHOCYTES
Lymphoblastic transformation test for studying immunity of pregnant women
[NASA-TT-F-14591] N72-32106

M

MACHINE TOOLS
Growth of silicon thick films and application for fabrication of dies and orifices
[NASA-CR-128415] N72-32718
MACHINERY
Handbook on tests for abrasive wear in various materials and systems
[AD-744182] N72-32513
MAGNESIUM
Influence of magnesium narcosis on rabbit body temperature
[NASA-TT-F-14550] N72-32097
Magnesiothermic reduction of subgroup 4A and subgroup 5A metals and alloys
[JPRS-57138] N72-32551
MAGNESIUM COMPOUNDS
Effect of various magnesium salts on luminous intensity and duration in phosphorescent bacteria
[NASA-TT-F-14431] N72-32112
MAGNETIC FIELDS
Literature survey and experimental results on morphological characteristics of biological action produced by magnetic fields
[AD-742513] N72-32126
Magnetic field model for estimating multi-polar magnetic fields associated with spacecraft in flight
[NASA-TM-X-66036] N72-32654
Approximate quantum theory of radiation of fast electrons in magnetic field
[NASA-TT-F-14450] N72-32676
Order and value of quantum corrections to total radiation intensity of fast electrons in magnetic field
[NASA-TT-F-14451] N72-32677
Spectrum of turbulence associated with magnetic pulsations of nonisothermal plasmas
[NP-19291] N72-32701
Three dimensional self-consistent analysis of dynamics of electric arc discharges exposed to arbitrary flow and magnetic fields
[AD-744520] N72-32712
MAGNETIC MATERIALS
Procedures for determining iron losses in magnetic laminations and measurement of radial airgap inductions in rotating electrical machines
[AD-743591] N72-32077
MAGNETIC MEASUREMENT
Comparison of techniques for measuring ambient magnetic fields of spacecraft with single and dual magnetometers
[NASA-TM-X-66041] N72-32464
Magnetic field model for estimating multi-polar magnetic fields associated with spacecraft in flight
[NASA-TM-X-66036] N72-32654
MAGNETIC MIRRORS
Closed magnetic mirror development by self-field of trapped ring current
[ORNL-TM-3783] N72-32651
Beam-plasma interactions and instabilities, and absolute instabilities with arbitrary propagation in mirror plasmas
[COO-1478-10] N72-32705
MAGNETIC PROPERTIES
Magnetic properties of nickel hydroxides
[NASA-TT-F-14448] N72-32157
Chemical preparation of colloidal magnetic fluids by peptization technique
[BM-TPR-59] N72-32659
Magnetic properties of insulating and conducting EuTe single crystals at cryogenic temperature
[AD-742603] N72-32722
MAGNETIC RECORDING
Dynamic characteristics and performance of thin film integrated magnetic recording head
[CEA-R-4164] N72-32187
MAGNETIC STORMS
Neutral density data from OGO-F and geomagnetic storms
[NASA-CR-122479] N72-32390
MAGNETIZATION
Magnetization and Mossbauer experiments giving evidence of superparamagnetism in quenched face centered cubic [gamma] phase of ternary Fe-C-V alloy, Viscalloy 2
[NASA-TM-X-68127] N72-32652
MAGNETO-OPTICS
Development of equipment for measuring magneto-optic rotation of ions in variety of glasses
[LA-4921] N72-32573
MAGNETOHYDRODYNAMIC STABILITY
Beam-plasma interactions and instabilities, and absolute instabilities with arbitrary propagation in mirror plasmas
[COO-1478-10] N72-32705
Abstracts of conference papers on magnetohydrodynamic stability, plasma generators, and plasma diagnostics
[NYO-3077-185] N72-32707
MAGNETOHYDRODYNAMICS
Two dimensional MHD model for phases after first fast compression of theta pinch discharges
[IPP-1/124] N72-32698
MAGNETOMETERS
Comparison of techniques for measuring ambient magnetic fields of spacecraft with single and dual magnetometers
[NASA-TM-X-66041] N72-32464
MAGNETOSPHERE
Design studies for X ray experiment using solid state detectors or proportional counter for exploring magnetospheres of Saturn and Jupiter and cosmic X ray sources
[NASA-CR-128250] N72-32455
OGO 4 data on low energy electron precipitation in polar magnetosphere, and latitude and local time dependence
[NASA-TM-X-66035] N72-32783
MAINE
Development of land use-peak runoff classification system for highway engineering purposes in Maine using ERTS-1 imagery
[E72-10088] N72-32341
MAINTENANCE
Calibration and maintenance of equipment designed to monitor meteorological and oceanographic parameters for navigation buoys
[AD-742659] N72-32426
MAMMALS
Aerial photogrammetric surveys of sea otter abundance and distribution at Amchitka Island, Alaska
[BMI-171-135] N72-32422
MAN MACHINE SYSTEMS
Arranging tasks, in fighting vehicle, to capability of soldier
[RAE-LIB-TRANS-1658] N72-32136
Application of human-like teleoperator machine and robots to various industrial tasks
[NASA-TT-F-14553] N72-32492
MANAGEMENT PLANNING
NASTRAN management, research and development, and priorities
N72-32868
MANEUVERABILITY
Effect of maneuvers and flight conditions on helicopter pilot eye movements
[AD-742276] N72-32130
MANNED SPACE FLIGHT
Background and preparations for first manned space flight by first cosmonaut
[NASA-TT-F-14606] N72-32979
MANNED SPACECRAFT
Detailed examination of human engineering design standard MSFC-STD-267A for manned spacecraft design and recommendations for improvement of standard for future missions
[NASA-CR-61393] N72-32846
MANUFACTURING
Bibliographies on seal designs and applications
[AD-744050] N72-32504

MANY BODY PROBLEM
Brueckner-Hartree-Fock theory generalized to permit calculations for intrinsic states having permanent deformation
[NASA-TM-X-68134] N72-32678

MAPPING
Color coding scheme for cartographic symbology, using raster plotter software
[AD-740605] N72-32215
Man-made culture interpretation and culture revision of small-scale maps using ERTS-1 multispectral imagery
[E72-10098] N72-32351
Cartographic evaluation of ERTS-1 orbit and attitude data based on return beam vidicon data
[E72-10100] N72-32353
Mapping in polar regions using ERTS-1 return beam vidicon imagery
[E72-10102] N72-32355
Mapping and detection of changes of snow cover on land and glaciers using ERTS-1 imagery
[E72-00103] N72-32356
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372
Mapping seismically active faults in Alaska using ERTS-1 imagery
[E72-10130] N72-32378
Identification, definition, and mapping of terrestrial ecosystems in interior Alaska using ERTS-1 imagery
[E72-10137] N72-32385
Application of ERTS-1 imagery to geologic and tectonic mapping of Montana
[E72-10141] N72-32388
Potential impact of ERTS, Skylab, and other remote sensing data on cartography and photogrammetry programs in Canada
[M75-2/4] N72-32448
Solar mapping data acquisition, and brightness-temperature and polarization data
[AD-742235] N72-32792

MAPS
Preparation of hydrologic atlases of arid land watersheds based on ERTS-1 imagery
[E72-10113] N72-32364

MARINE BIOLOGY
Marine bionics for duplicating biological systems and studying pattern recognition mechanisms in living organisms
[AD-742638] N72-32124
Aerial photogrammetric surveys of sea otter abundance and distribution at Amchitka Island, Alaska
[BMI-171-135] N72-32422
Military navigation satellite time dissemination, dolphin acoustics, biodegradation of crude oil by marine microorganisms, and research notes
N72-32970

MARS [PLANET]
Measurements of surface and atmospheric conditions of planet Mars obtained by USSR Mars 2 and Mars 3 space probes
[NASA-TT-F-13919] N72-32817
Analysis of error covariance matrices for accuracy in determining gravitational coefficients of Mars gravitational potential function
[NASA-TN-D-6949] N72-32834

MARS ATMOSPHERE
Measurements of surface and atmospheric conditions of planet Mars obtained by USSR Mars 2 and Mars 3 space probes
[NASA-TT-F-13919] N72-32817

MARS LANDING
Wind tunnel flow field measurements around Mars lander model using hot-film anemometers under simulated Mars surface conditions
[NASA-TN-D-6820] N72-32853

MARS PROBES
Measurements of surface and atmospheric conditions of planet Mars obtained by USSR Mars 2 and Mars 3 space probes
[NASA-TT-F-13919] N72-32817

MARS SURFACE
Measurements of surface and atmospheric conditions of planet Mars obtained by USSR Mars 2 and Mars 3 space probes
[NASA-TT-F-13919] N72-32817

MASS FLOW
Design and operation of first-stage and two-stage of small, low cost turbofan engine to determine specific work, torque, mass flow, and efficiency
[NASA-TN-D-6967] N72-32072
Atmospheric transport and diffusion in boundary layer, wake turbulence, energy profiles of wind fluctuations, micrometeorology, and diffusion climatology
[TID-25979] N72-32610
Curves for use with total heat and static pressure sampling methods for gross thrust, mass flow, and choking pressure ratio of air breathing engines in flight
[ESDU-69008] N72-32746
Gross thrust and nozzle mass flow measurements for air breathing, ducted flow engines
[ESDU-69007] N72-32747

MASS SPECTROMETERS
Concentration of NO2 ions in lower ionosphere determined with rocket-borne, quadrupole ion mass spectrometer
[NASA-TM-X-66024] N72-32395
Modulated beam mass spectrometer for studying vaporization/reflection reactions and thermodynamics of graphite material for use on reentry vehicle surfaces
[AD-744493] N72-32953

MASS SPECTROSCOPY
Mass spectroscopy measurements of desorption of oxygen from tungsten by means of electron impact
[NASA-TT-F-14481] N72-32156
Chemical ionization mass spectrometry with moist N2 or air as reactant gas
[AD-743453] N72-32163
Mass spectrometric search for polymers in carbon vapors and analysis of graphite vaporization kinetics
[AD-744494] N72-32165

MASS TRANSFER
Formation and evolution of low layer stratiform cloud originating in transformation of warm air mass over cold underlying surface
[NLL-RTS-7059] N72-32600

MATERIALS
Handbook on tests for abrasive wear in various materials and systems
[AD-744182] N72-32513

MATERIALS HANDLING
Analysis of closed loop conveyor system with single loading station, single unloading station, and operating with varying input and output flow rates
[AD-744529] N72-32508
Analysis of accomplishments in public transportation developments and predictions of future requirements
N72-32982

MATERIALS SCIENCE
National Bureau of Standards publication of Standard Reference Materials Price and Availability List for January 1972
[NBS-SP-360] N72-32569

MATERIALS TESTS
Use of profilograph recordings and microphotographs to determine single traces of impact and product of wear in abrasive erosion
[NLL-RTS-7374] N72-32488
Effect of solarization on lasing properties of glass
[AD-744225] N72-32537
Proceeding of conference on effects of stress corrosion on cracking in stainless steel, corrosion in high strength alloys, and degradation of silicon nitride materials - Vol. 2
[AD-744205] N72-32565
Properties of two high temperature hydraulic fluids under shear and thermal stress conditions
[AD-744106] N72-32582
Development of procedures for predicting performance of materials in components and structures with application to decisions for specific designs
[AD-743991] N72-32920
Modulated beam mass spectrometer for studying vaporization/reflection reactions and thermodynamics of graphite material for use on reentry vehicle surfaces
[AD-744493] N72-32953

MATHEMATICAL LOGIC
Computer architectural language for designing machines to perform onboard computational functions
[AD-743014] N72-32216
Computer programs for analyzing axial compressor aerodynamic test data
[AD-744503] N72-32756

MATHEMATICAL MODELS
Mathematical models for determining viscous interaction effects on sharp leading edges and blunt bodies during reentry at supersonic and hypersonic speeds
N72-32004
Development and use of mathematical models of signals from TDR satellite
[NASA-CR-130055] N72-32178
Mathematical models for analyzing structural-acoustic interactions in metal-ceramic piezoelectric transducers
[AD-743985] N72-32236
Models of underthrusting lithospheric plates for calculating displacement and deflection
[NASA-TM-X-66028] N72-32397
Dynamic model of air-sea interactions
[AD-743864] N72-32436
Load-life model for calculating fatigue life and reliability of helicopter spur gear mesh
[AD-744504] N72-32507
Equivalent equation to problems of gas lubricated bearings
[AD-744264] N72-32509
Stratiform cloud formation model of origin and growth of collection of drops in homogeneous air mass rising with constant velocity
[NLL-RTS-7057] N72-32598
Model of character and growth of stratiform cloud containing water in gas, liquid, and ice phases and of purely crystalline cloud
[NLL-RTS-7061] N72-32602
Magnetic field model for estimating multi-polar magnetic fields associated with spacecraft in flight
[NASA-TM-X-66036] N72-32654
Architectural acoustics, and physical and technological factors in acoustic field modeling
[NASA-TT-F-14466] N72-32658
Eigenvalues and eigenstates of S matrix in Lee model in V theta-N theta and V2 theta-N3 theta sectors
[TR-73-023] N72-32675
Model for calculation of synchrotron emission from high energy electrons in planetary Van Allen belts
[NASA-TM-X-66015] N72-32781
Mathematical procedure for calculating fragmentation of meteor bodies in flares
[NASA-TT-F-14456] N72-32823
Lumped mass model of impact between fuel duct and in-vessel fuel handling machine
N72-32879
Pseudothermodynamic model of system in thermodynamic disequilibrium
[INR-P-1367] N72-32951

MATRICES [MATHEMATICS]
Generalized matrix inversion used for modification of differential correction schemes in nonlinear regression
[NASA-CR-2119] N72-32587
Explicit expression for Mie phase matrix in 4-component Stokes vector representation for system containing polydispersion of spherical particles
[NASA-CR-128174] N72-32775

MEASURING INSTRUMENTS
Electron microprobe measurement of tungsten and molybdenum oxidation in oxygen atmospheres at low pressures and high temperature
[NASA-TT-F-14559] N72-32148
Basic components of opto-electronic image recording systems, using night sky illumination
[AD-744056] N72-32240
Calibration and maintenance of equipment designed to monitor meteorological and oceanographic parameters for navigation buoys
[AD-742659] N72-32426
Ground surveys and instrumentation for automation of measuring processes
[AD-743995] N72-32435
Circuit for eliminating reading ambiguities in digital measuring instruments
N72-32465

MECHANICAL DEVICES
Nondestructive, structure borne acoustics technique for checkout, monitoring, fault diagnosis, and readiness assessment of mechanical devices for future space missions
[NASA-CR-128171] N72-32491
Design and operation of multi-finger automatic mechanical hands for industry
[NASA-TT-F-14554] N72-32493

MECHANICAL DRIVES
Graf driving machine for determining sobering effect of caffeine and pervitin on intoxicated individual
[NASA-TT-F-14564] N72-32099
Development and characteristics of core turbine for driving single and two stage fans in turbofan engine simulator
[NASA-TM-X-68130] N72-32762

MECHANICAL PROPERTIES
Mechanical properties of wrought and cast nickel and cobalt alloys in helium/hydrogen or hydrogen mixtures
[NASA-CR-123829] N72-32145
Mechanical properties and defects in refractory, body-centered cubic metals
[IS-2773] N72-32553
Experimental determination of dynamic properties of tantalum
[AD-741217] N72-32557
Chemical, mechanical, and physical properties of surface treated carbon fibers
[AD-743469] N72-32577

MEDICAL EQUIPMENT
Bioinstrumentation for improving Apollo biomedical ground monitoring system
[NASA-CR-128536] N72-32138

MELTING
Study of ice break-up characteristics in Chena River Basin using ERTS-1 imagery
[E72-10135] N72-32383

MEMBRANE STRUCTURES
Critical flutter velocity for membrane in nonconservative system
[NASA-TT-F-14576] N72-32905

MENTAL PERFORMANCE
Effect of caffeine on athletic performance in 100 yard dash
[NASA-TT-F-14561] N72-32098

MERCURY [METAL]
Solid state amplifier for bridge circuit of atomic absorption mercury detector
[RI-7676] N72-32227

MERCURY ARCS
Surged voltage drops over low density mercury arc in inductive current circuit, concentrated in space charge sheath
[TRITA-EPP-71-20] N72-32697

MESOSPHERE
Faust model of mesospheric circulation related to noctilucent cloud frequency
[NASA-TT-F-14415] N72-32410
Global composition of stratosphere and mesosphere based on sounding rocket observations and satellite remote sensing techniques
[NASA-TM-X-66044] N72-32417
Meteorological synoptic analyses in stratosphere and lower mesosphere and F min values over North America
[AD-744470] N72-32437

METABOLISM
Rare gas effects on metabolism and inert gas narcosis
[NASA-CR-128213] N72-32083

METAL BONDING
Nondestructive detection of bond defects in regenerative cooled thrust chamber walls
[NASA-CR-120980] N72-32502

METAL FATIGUE
Annealed foil fatigue sensor for full-scale C-5A aircraft
[AD-743968] N72-32058

METAL FILMS
Application of ellipsometry for determining characteristics of thin metal films used for electrical purposes
[AD-744065] N72-32723

METAL OXIDES
Molecular energy level radiative lifetimes of metallic and alkaline earth oxides by nonshock tube methods
[AD-744061] N72-32161

METAL PLATES
Mathematical models for analyzing structural-acoustic interactions in metal-ceramic piezoelectric transducers
[AD-743985] N72-32236

METAL PROPELLANTS
Formation of aluminum powder for propellant grains by rounding random shaped particles in fluid energy mill operating on inert gas
[AD-743484] N72-32744

METAL STRIPS
Conductor procedure for fabricating twisted multifilament Nb3Sn superconductive ribbon
[NASA-TM-X-68124] N72-32715

METAL SURFACES
Relationship of temperature to evaporation in metal surfaces
N72-32540

METAL WORKING
Incompressibility equation for determining high speed strain hardening of metal during pressure shaping from specimen test data
[AD-744185] N72-32514

METALLIC PLASMAS
Penetration of thin aluminum plate by quartz simulating micrometeoroid penetration and dense aluminum plasma expansion
[NASA-CR-123830] N72-32690

METALLURGY
Testing metals for tension, impact and variable loads
[JPRS-57075] N72-32912
Computer derived damage functions for engineering of reactor vessel steel embrittlement caused by neutron irradiation, and research progress notes
N72-32977

METALS
Specimen holder with vertical oscillation and rotation for determining preferred orientation in metals by X ray diffraction
[ARL/MET-81] N72-32468
Observation of plasma formation and plasma jet shaping during laser action on metals
[NASA-TT-F-14476] N72-32520
Potential of laminar metal-metal composites for use at elevated temperatures
[NASA-TM-X-68056] N72-32541
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550
Comparative wear resistance of metal, phenols, and polyamide coatings
[AD-743825] N72-32558
National Bureau of Standards publication of Standard Reference Materials Price and Availability List for January 1972
[NBS-SP-360] N72-32569
Adhesion and transfer of polytetrafluoroe thylene to metals, and Auger emission spectroscopy
[NASA-TN-D-6983] N72-32571

METEORITE CRATERS
Rb-Sr isotopic study of 5 Bosumtwi, Ghana, crater glasses and 3 Ivory Coast tektites
[NASA-TT-F-14437] N72-32830

METEORITES
Development of computer programs for reducing data obtained from Radiation and Meteoroid Satellite mission
[NASA-CR-128535] N72-32833

METEORITIC COMPOSITION
Structure and mineral composition of meteor dust and meteorites
[NASA-TT-F-14472] N72-32825

METEOROIDS
Meteor spectrograms used to determine intensity distributions at various points of trajectory
[NASA-TT-F-14490] N72-32819
Mathematical procedure for calculating fragmentation of meteor bodies in flares
[NASA-TT-F-14456] N72-32823
Cause of meteor flares attributed to passage through atmospheric layers of different density
[NASA-TT-F-14475] N72-32824
Numerical analysis of drag and heat transfer coefficients for meteor bodies during atmospheric entry
[NASA-TT-F-14491] N72-32837

METEOROLOGICAL INSTRUMENTS
Geothermograph and meteorophytograph for automation of agrometeorological observations
[NASA-TT-F-14469] N72-32405

METEOROLOGICAL PARAMETERS
Calibration and maintenance of equipment designed to monitor meteorological and oceanographic parameters for navigation buoys
[AD-742659] N72-32426
Meteorological synoptic analyses in stratosphere and lower mesosphere and F min values over North America
[AD-744470] N72-32437
Meteorological and ballistics data for launch of Honest John rocket vehicle 141
[AD-743839] N72-32618
Meteorological and ballistics data for launch of Honest John missile launch 352
[AD-743840] N72-32619
Meteorological and ballistics data for launching 03702 Honest John Missile Number 1624 Round 623 AML
[AD-743841] N72-32620
Meteorological data tables gathered for launching 12808 Lance missile number 2146 round 157 SPL
[AD-743843] N72-32622
Meteorological and ballistics data for launching of 11602 Lance missile 2131 round 156 EST
[AD-743844] N72-32623

METEOROLOGICAL SATELLITES
Using quantitative radiance measurements from geosynchronous satellite for statistical weather forecasting
[AD-744098] N72-32635
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - general findings and studies on international law, water resources management, and recreation
[NASA-CR-127335] N72-32974
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - studies on earth resources utilization, agriculture, and commerce
[NASA-CR-127336] N72-32975

METHOD OF CHARACTERISTICS
Characteristic equations for elastic wave propagation
[NASA-CR-128216] N72-32910

METROLOGY
Definitions, symbols, and recommended usage of International System of Units [SI]
[NBS-SP-330-1972] N72-32968

MICROELECTRONICS
Two stage, solid state, microcircuit power amplifier in 2.25 GHz region of S band
[NASA-CR-130062] N72-32228
Microcircuit device environmental tests
[AD-744018] N72-32239
Microelectronics in military technology, including compact mounting method and thin film and solid state circuitry
[AD-744173] N72-32246

MICROMETEOROIDS
Penetration of thin aluminum plate by quartz simulating micrometeoroid penetration and dense aluminum plasma expansion
[NASA-CR-123830] N72-32690

MICROMETEOROLOGY
Phenomena in air layer near ground caused by divergence of radiation balance and fluxes due to exchange of sensible and latent heat
[NASA-TT-F-14552] N72-32604
Computerized simulation of tropical forest atmosphere
[AD-744482] N72-32613

MICROORGANISMS
Death behavior of microorganisms during heat sterilization
[NASA-TT-F-14543] N72-32086
Water soluble filter for trapping airborne microorganisms
[NASA-TT-F-14440] N72-32111

MICROSTRUCTURE
Radiographic study of structural changes of electrodes of annealed and deformed nickel or copper-nickel powders subjected to single spark discharge
[NLL-RTS-7269] N72-32538
Influence of different processing histories and microstructure on low temperature creep of Ti-Al-Sn
[SCL-RR-720227] N72-32554
Effects of various pretreatments on microstructural stability of austenitic stainless steels from 550 to 750 C
[ORO-4044-2] N72-32556
Effect of grain size on strength of ceramic materials and comparison with aluminum oxide structures
[AD-744047] N72-32576
Influence of stoichiometric deviations on sintering mechanisms of defect CoO
[AD-744517] N72-32578

MICROWAVE EQUIPMENT
Microwave ILS scanning beam data rate analysis for low visibility approach of H-53 helicopter
[AD-743612] N72-32057
Microwave holography as diagnostic method for radomes, antennas, and wave propagation
[AD-744072] N72-32526

MICROWAVE RADIOMETERS
Microwave radiometer measurements at 10.2 and 30 GHz on dust clouds during Event Dial Pack, July 1970
[AD-744084] N72-32441

MIDAIR COLLISIONS
Analysis of midair collisions in US civil aviation for 1969 to 1970 to determine areas of commonality as accident prevention measure
[NTSB-AAS-72-6] N72-32046

MIE SCATTERING
Explicit expression for Mie phase matrix in 4-component Stokes vector representation for system containing polydispersion of spherical particles
[NASA-CR-128174] N72-32775

MIGRATION
Changes in continental migratory bird habitats studied using ERTS-1 imagery
[E72-00106] N72-32358

MILITARY AIR FACILITIES
Method for evaluation of operational and functional performance characteristics of landing mats
[AD-741857] N72-32278

MILITARY AIRCRAFT
Aerodynamic characteristics and performance of Russian M-4 supersonic long range aircraft
[AD-744159] N72-32051
Noise encountered with fixed-wing utility-type military aircraft
[AD-742972] N72-32052
Investigation of military aircraft accidents involving vertigo and orientation errors
[AD-743483] N72-32061
Development of controller design procedure for aircraft throughout entire flight envelope based on quadratic optimal control technology
[AD-744491] N72-32068
Painting schemes for improving rotating propeller and tail rotor visibility of military aircraft
[AD-744453] N72-32579

MILITARY HELICOPTERS
Interrelationship of parameters involved in developing reliability test requirements for military helicopters - Vol. 2
[AD-741377] N72-32053
Sensitivity analysis applied to helicopter development reliability test requirements - Vol. 3
[AD-742247] N72-32054
Investigation of military aircraft accidents involving vertigo and orientation errors
[AD-743483] N72-32061

MILITARY TECHNOLOGY
Arranging tasks, in fighting vehicle, to capability of soldier
[RAE-LIB-TRANS-1658] N72-32136
Microelectronics in military technology, including compact mounting method and thin film and solid state circuitry
[AD-744173] N72-32246
Congressional hearings to determine fiscal year 1973 authorization for military procurement, research and development, and personnel strength
N72-32963

MINERAL DEPOSITS
Evaluation of mineral resources based on ERTS-1 identification of continental crust geostructures
[E72-10095] N72-32348

MINES [EXCAVATIONS]
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336

MIRRORS
Scale model of big telescope on altazimuth mounting and arrangement of control system
[NLL-RTS-7354] N72-32450
Quality control of scatter plates for interferometric measurement of surface configurations of telescope mirrors and other optical components
[NASA-TM-X-64691] N72-32473

MISSILE RANGES
White Sands Missile Range climate calendar covering mean daily minimum, maximum, and extreme temperature from 1950 to 1971
[AD-743842] N72-32621

MISSILES
Statoreactors for hypersonic aircraft, satellite launch vehicles, and missiles
N72-32752
Buckling location and degradation factor due to temperature distribution for interstage of three stage missile
N72-32871

MISSION PLANNING
Operational modes handbook for guidance system operations plan involving manned command module earth orbital missions using program SKYLARK 1 - Vol. 4
[NASA-CR-128544] N72-32641
Orbital operations study to show interfacing activities, mission models, and potential interfacing element pairs - Vol. 1
[NASA-CR-128203] N72-32795
Interfacing activity analyses summary of orbital operations study - Vol. 2 Pt. 1
[NASA-CR-115721] N72-32796
Analysis of mating, orbital assembly, separation, payload deployment, and payload retraction for orbital operations study - Vol. 2 Pt. 2
[NASA-CR-115722] N72-32797
Data management analysis of orbital operations study to include communications, rendezvous, stationkeeping, and detached element operations - Vol. 2 Pt. 3
[NASA-CR-115723] N72-32798
Support operations activity analysis of orbital operations study to include crew transfer, cargo transfer, propellant transfer, and attached element operations - Vol. 2 Pt. 4
[NASA-CR-115724] N72-32799
Spacecraft and aerospace vehicle configurations for performance of space missions considered in orbital operations study - Vol. 3
[NASA-CR-115725] N72-32800
Analysis of orbital operations mission to verify existence of safe, feasible design concepts for mission accomplishment - Appendix A
[NASA-CR-115727] N72-32801
Operational procedures for each alternate approach for each interfacing activity of orbital operations study - Appendix B
[NASA-CR-128202] N72-32802
Bibliography of documents used during orbital operations study and description of space program elements - Appendix C
[NASA-CR-128201] N72-32803
Orbital operations study to include generic mission models, element pair interactions, and interfacing activities - Executive Summary
[NASA-CR-115726] N72-32804
Skylab mission SL-3 mission requirements - Revision 6
[NASA-TM-X-68613] N72-32808
Planning intercept missions to comets
[NASA-TM-X-66026] N72-32810
Mission planning, launch, communication, and testing of Intelsat 4 spacecraft
[NASA-TM-X-68626] N72-32818
Defining space station options for experiment of 5 to 10 years
[NASA-CR-123759] N72-32842
Mission analysis and spacecraft technical description of Explorer flight to study solar wind integration with Grigg-Skjellerup comet in 1977
[NASA-TM-X-66023] N72-32850

MODELS
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361
X ray diffraction models for nonspecialists
[ARL/MET-78] N72-32539

MODULES
Design, fabrication, and testing of 5V ten-diode heat pipe thermionic module
[WASH-1199] N72-32952

MOLECULAR ENERGY LEVELS
Molecular energy level radiative lifetimes of metallic and alkaline earth oxides by nonshock tube methods
[AD-744061] N72-32161

MOLECULAR IONS
Concentration of NO2 ions in lower ionosphere determined with rocket-borne, quadrupole ion mass spectrometer
[NASA-TM-X-66024] N72-32395

MOLECULAR PUMPS
Increase of chemical laser efficiency by gasdynamical pumping
[IPP-IV-10] N72-32522

MOLECULAR STRUCTURE
Molecular structures, material characteristics, and analytic techniques
[AD-744107] N72-32166

MOLECULES
Gelification of multifunctional macromolecular system
[NASA-TT-F-14487] N72-32152

MOLYBDENUM
Electron microprobe measurement of tungsten and molybdenum oxidation in oxygen atmospheres at low pressures and high temperature
[NASA-TT-F-14559] N72-32148

MOMENTS
Bending of strut in one plane under combined action of end loads, side load, and end restraining moments
[ESDU-01.01.16] N72-32863

MOMENTUM THEORY
Momentum theory for optimum design of wing surfaces
N72-31999

MONITORS
Bioinstrumentation for improving Apollo biomedical ground monitoring system
[NASA-CR-128536] N72-32138

MONOCHROMATIZATION
Beam monochromatization by resonator with ion-optical system
[JINR-P9-6252] N72-32266

MONOCHROMATORS
Design and construction of grazing incidence telemetering monochromators for observing solar far ultraviolet and soft X ray radiation
[AD-743835] N72-32793

MONTANA
Application of ERTS-1 imagery to geologic and tectonic mapping of Montana
[E72-10141] N72-32388

MOON
Genesis of moon
[NASA-TT-F-14513] N72-32394

MORPHOLOGY
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354

MOSSBAUER EFFECT
Magnetization and Mossbauer experiments giving evidence of superparamagnetism in quenched face centered cubic [gamma] phase of ternary Fe-C-V alloy, Viscalloy 2
[NASA-TM-X-68127] N72-32652

MOTION SICKNESS
Role of higher sections of central nervous system in motion sickness
[AD-742409] N72-32133

MOUNTAINS
Automatic data processing techniques for interdisciplinary analysis of ERTS-1 imagery data for Colorado mountain environments
[E72-10081] N72-32340
Glaciology and volcanology studies of Wrangell Mountains, Alaska
[E72-10129] N72-32377

MULTIPATH TRANSMISSION
Range rate errors due to specular and diffuse multipath for TDR satellite
[NASA-CR-130054] N72-32177
Range rate errors due to multipath reflection for TDR satellite
[NASA-CR-130056] N72-32181

MULTIPLEXING
Analysis and testing of demultiplexer to determine feasibility and optimum method for modification for broadband operation
[NASA-CR-123825] N72-32172

MULTIPOLAR FIELDS
Magnetic field model for estimating multi-polar magnetic fields associated with spacecraft in flight
[NASA-TM-X-66036] N72-32654

MULTISPECTRAL PHOTOGRAPHY
Man-made culture interpretation and culture revision of small-scale maps using ERTS-1 multispectral imagery
[E72-10098] N72-32351
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372
Analysis of ERTS-1 multispectral data and imagery of northwest Saudi Arabia
[E72-10140] N72-32387

MUSCULOSKELETAL SYSTEM
Stabilograph for stability determination of stance and fine adjustments to body equilibrium
[AD-741265] N72-32128

MUSEUMS
Survey of existing aerospace museums, and feasibility of establishing aerospace museum in western United States Summary, conclusions, and recommendations
[NASA-CR-127333] N72-32955
Potential locations of aerospace museums in western US, existing museums with aerospace exhibits, and activities, curatorial responsibilities, and funding of museums
[NASA-CR-127334] N72-32956

N

N-TYPE SEMICONDUCTORS
Current-voltage characteristics under load of p-type GaAs on n-type GaAs substrate prepared by liquid epitaxial growth
[NASA-TT-F-14592] N72-32075
Preparation of n-type material for high diode efficiency and defects in GaP
[NASA-CR-112111] N72-32719

NARCOSIS
Rare gas effects on metabolism and inert gas narcosis
[NASA-CR-128213] N72-32083
Influence of magnesium narcosis on rabbit body temperature
[NASA-TT-F-14550] N72-32097

NASA PROGRAMS
Hearings before House Subcommittee on NASA oversight on real estate management and disposal, and excess land declarations at Lewis and Langley Research Centers and Wallops Island
N72-32964
Report to House of Representatives on benefits accruing from space program
[H-REPT-92-1452] N72-32967

NAVIER-STOKES EQUATION
Numerical analysis of equilibrium flows considering ionization, thermal, and barodiffusuon reactions for arbitrary mixtures with various diffusion properties
[JPRS-57017] N72-32306

NAVIGATION AIDS
Low altitude flight test to determine accuracy of VOR Tacan air navigation aid
N72-32642

NAVIGATION INSTRUMENTS
Principles of construction and operation of heading indicators used in civil aviation
[JPRS-57031] N72-32640

NAVIGATION SATELLITES
Characteristics of Timation 3 circular polar orbit, and suitability of using laser ranging observations of Timation 3 for studies of earth geodynamics
[NASA-TM-X-66012] N72-32851
Military navigation satellite time dissemination, dolphin acoustics, biodegradation of crude oil by marine microorganisms, and research notes
N72-32970

NEODYMIUM
Nd YAG laser with self compensation of thermally induced stress birefringence
[AD-743979] N72-32525

NERVOUS SYSTEM
Evoked potentials and electrophysiology of nervous system
[NASA-CR-128249] N72-32081

NETHERLANDS
Research projects conducted by National Aerospace Laboratory of Netherlands during 1971
N72-32973

NETWORK ANALYSIS
Feedback control model for network flow with multiple pure time [or transport] delays
[NASA-TM-X-66020] N72-32258

NETWORK SYNTHESIS
Combinatorial network synthesis and analysis of binary synchronous counting circuits
[AD-744269] N72-32219

NEUROLOGY
Neurological effects of drug isoniazid on pilot performance
[AD-744808] N72-32119

NEUTRAL PARTICLES
Energetic neutral particle beams for filling and heating fusion devices
[ORNL-TM-3788] N72-32687

NEUTRON IRRADIATION
Effect of fast neutron irradiation on ductility of austenitic stainless steel at low and high temperatures
[CONF-720420-4] N72-32555
Computer derived damage functions for engineering of reactor vessel steel embrittlement caused by neutron irradiation, and research progress notes
N72-32977

NEUTRON SPECTRA
Interactive computer graphics for on-line determination of neutron spectra from proton recoil distributions
[NASA-TM-X-68062] N72-32205

NEUTRONS
Q switched laser beam as ion source for pulsed neutron generator
[CEA-R-4273] N72-32523

NEW MEXICO
Wind turbulence characteristics and temperature data over heterogeneous terrain at White Sands, New Mexico
[AD-743456] N72-32627

NICKEL ALLOYS
Mechanical properties of wrought and cast nickel and cobalt alloys in helium/hydrogen or hydrogen mixtures
[NASA-CR-123829] N72-32145

NICKEL CADMIUM BATTERIES
Development of 100 ampere hour nickel cadmium battery with reduced internal impedance and improved electrical performance
[NASA-CR-112139] N72-32071

NICKEL OXIDES
Hydroxide of bivalent nickel on nickel oxide electrode of alkaline storage battery
[NASA-TT-F-14449] N72-32073
Magnetic properties of nickel hydroxides
[NASA-TT-F-14448] N72-32157

NIGHT SKY
Basic components of opto-electronic image recording systems, using night sky illumination
[AD-744056] N72-32240

NIMBUS PROJECT
Application of color display techniques for analysis of Nimbus infrared radiation data
[NASA-TN-D-6786] N72-32462

NIMBUS SATELLITES
Backscattering measurements from atmospheric aerosols using radiometer on Nimbus F satellite
[NOAA-TR-NESS-60] N72-32780

NIMBUS 4 SATELLITE
Estimation of sea surface temperature from Nimbus 4 measurements in 11-13 micron window region
[NASA-TM-X-66053] N72-32418

NIOBIUM ALLOYS
Fabrication of stabilized Nb3Al superconductors with binary and ternary intermetallics
[NASA-TM-X-68126] N72-32716

NIOBIUM STANNIDES
Conductor procedure for fabricating twisted multifilament Nb3Sn superconductive ribbon
[NASA-TM-X-68124] N72-32715

NITRIDING
Formation of nitrous austenite during diffusion saturation of 38 KhA steel
[AD-744151] N72-32560

NITROGEN
Vibrational energy distribution of nitrogen molecules in electronic ground state
[AD-743567] N72-32528

NITROGEN DIOXIDE
Concentration of NO2 ions in lower ionosphere determined with rocket-borne, quadrupole ion mass spectrometer
[NASA-TM-X-66024] N72-32395

NITROGEN TETROXIDE
Engineering criteria for predicting and preventing flow decay in operational nitrogen tetroxide systems
[AD-744110] N72-32745

NOCTILUCENT CLOUDS
Faust model of mesospheric circulation related to noctilucent cloud frequency
[NASA-TT-F-14415] N72-32410
Observational and theoretical data on noctilucent clouds
[NASA-TT-F-14414] N72-32412
Colorimetric measurement of visual color and true color in noctilucent clouds
[NASA-TT-F-14460] N72-32822

NOISE [SOUND]
Effect of continuous noise and vibration on carbohydrate, fat, and protein metabolism in white rats
[NASA-TT-F-14569] N72-32090
Effect of noise and vibration on hearing and worker ear structures
[NASA-TT-F-14542] N72-32094

NOISE INTENSITY
Analysis of aircraft noise generation and optimization of flight paths to minimize effects of aircraft noise during takeoff
[NASA-TT-F-14468] N72-32042
Development of advanced technology for identifying and minimizing sources of noise in aircraft engines
[NASA-TM-X-68131] N72-32043
Numerical analysis of total sound pressure field emitted by stationary rotating jet and sound field from same jet in motion observed at fixed point on ground
[NASA-TT-F-14489] N72-32047
Effects of prolonged wideband noise on functional condition of human organism
[NASA-TT-F-14567] N72-32088
Influence of biological rhythm on daily periodical hearing in person subjected to prolonged noise
[NASA-TT-F-14568] N72-32089

NOISE REDUCTION
Development of advanced technology for identifying and minimizing sources of noise in aircraft engines
[NASA-TM-X-68131] N72-32043
Methods for reducing electrical noise interference in acoustic emission signal processing
[BNWL-1596] N72-32259
Concept for jet noise suppression for afterburning turbojet engine
[NASA-TM-X-68144] N72-32763

NOISE TEMPERATURE
Simulation study to determine 136 MHz and 400 MHz noise temperature of ground antennas for tracking RAE-B during data transmissions
[NASA-TM-X-66047] N72-32184

NONDESTRUCTIVE TESTS
Experimental technique for measuring in-plane displacements by holographic interferometry
[AD-744490] N72-32483
Nondestructive, structure borne acoustics technique for checkout, monitoring, fault diagnosis, and readiness assessment of mechanical devices for future space missions
[NASA-CR-128171] N72-32491
Nondestructive detection of bond defects in regenerative cooled thrust chamber walls
[NASA-CR-120980] N72-32502
Use of holography as tool in various laboratory investigative procedures
[SC-DC-721230] N72-32524
Basic experimental parameters associated with using laser speckle correlation fringes to measure in-plane strain
[AD-744489] N72-32533
Ultrasonic inspection of weldments in cast iron cylinder
[TR-7206.587] N72-32545
Development of procedures for predicting performance of materials in components and structures with application to decisions for specific designs
[AD-743991] N72-32920
Application of nondestructive testing techniques for improving aircraft safety and aircraft accident reduction
N72-32981

NONEQUILIBRIUM FLOW
Nonequilibrium real gas effects on lifting reentry aerothermodynamics of space shuttle vehicle
N72-32003
Nonequilibrium flow and chemistry associated with rocket exhaust effluents in upper atmosphere
[AD-744081] N72-32633

NONLINEAR EQUATIONS
Calculating downwash angles behind wings with small span-chord ratios moving at subsonic speeds using nonlinear algebraic equations
N72-32009
Generalization of regula falsi for approximate calculation of null points of system of nonlinear equations
[NASA-TT-F-14420] N72-32588

NONLINEAR FILTERS
Development of approximate nonlinear theory for orbit estimation
[NASA-CR-127326] N72-32807

NONLINEAR PROGRAMMING
Nonlinear programming for air traffic control systems
[AD-743569] N72-32596

NONLINEAR SYSTEMS
Development of algorithm for solving problem of controlling time-varying linear avionic system with random parameters based on adaptive dual control strategy - Part I
[AD-744115] N72-32064

NORTH AMERICA
Evaluation of mineral resources based on ERTS-1 identification of continental crust geostructures
[E72-10095] N72-32348
Analysis of interdependence of lake ice and climate in Central North America using ERTS-1 imagery
[E72-10121] N72-32371

NORTH CAROLINA
Environmental impact statement on proposed airport construction at West Jefferson, North Carolina
[PB-206552-F] N72-32276

NORWAY
Development and characteristics of seismological station and data processing system in Norway
[AD-740845] N72-32447

NOSES [FOREBODIES]
Computer program ASAAS for asymmetric stress analysis of axisymmetric solids and application to prediction of thermal stresses in reentry vehicle nosetip
[AD-743897] N72-32859

NOZZLE DESIGN
Application of wirewound tungsten composites for design and fabrication of rocket components
[AD-743978] N72-32575

NOZZLE FLOW
Experimental analysis of wall boundary layer growth in 10 deg half angle conical nozzle of reflected shock tunnel
[NASA-TM-X-2647] N72-32317
Characteristics of initial development of turbulent free mixing layer for hypersonic speeds and profile data downstream of exit of hypersonic nozzle
[NASA-TM-X-2602] N72-32318
Diagnostic techniques for determining fluid flow properties at nozzle exit and in lasing region of supersonic diffusion laser system
[AD-743999] N72-32531

NUCLEAR DEFORMATION
Brueckner-Hartree-Fock theory generalized to permit calculations for intrinsic states having permanent deformation
[NASA-TM-X-68134] N72-32678

NUCLEAR EXPLOSIONS
Microwave radiometer measurements at 10.2 and 30 GHz on dust clouds during Event Dial Pack, July 1970
[AD-744084] N72-32441
Development and characteristics of seismological station and data processing system in Norway
[AD-740845] N72-32447

NUCLEAR FUSION
Laser driven fusion pulses for generating commercial electric power in power plants
[LA-4858-VOL-1] N72-32521
Energetic neutral particle beams for filling and heating fusion devices
[ORNL-TM-3788] N72-32687

NUCLEAR PHYSICS
Asymptotic algebraic realization of SU[3] in chiral charge algebra and derivation of D/F ratio of hyperon axial vector semileptonic couplings and [g sub A][0]
[TR-72-065] N72-32671

NUCLEAR PROPULSION
Rocket propulsion, liquid propellants, and thermonuclear propulsion systems
N72-32751
Flow model used to determine factors influencing effective specific impulse of external nuclear pulse propulsion systems
[NASA-TN-D-6984] N72-32764

NUCLEAR REACTIONS
Atomic structure of Zr-93 and Zr-91 studied from stripping and pickup reactions induced by 13-MeV incident deuterons on Zr-92
[NASA-TN-D-6911] N72-32673

NUCLEONS
Exact nucleon-deuteron elastic single scattering integral and error analysis in sticking factor approximations
[NASA-TN-D-6884] N72-32679

NUMBER THEORY
Constructibly countable ordinals and gap minimality for well-ordered notation systems
[NASA-CR-128195] N72-32585

NUMERICAL ANALYSIS
Numerical computation of transonic flow around leading edge of wing profile
[NASA-TT-F-14285] N72-32010
Numerical analysis of orbital elements of celestial body
[NASA-TT-F-14444] N72-32832
Numerical thermomechanical model for welding and loading of fabricated structure
[AD-744212] N72-32930
Numerical analysis for predicting three-dimensional flow patterns in shells of heat exchangers and temperature distributions
[EF/TN/A/48] N72-32944

NUMERICAL WEATHER FORECASTING
Hydrodynamic theory of atmospheric circulation and numerical weather forecasting
[AD-744184] N72-32636

O

OAO 2
Interstellar reddening law in far ultraviolet determined from OAO 2 satellite filter photometry
[NASA-TM-X-66055] N72-32840

OCEANOGRAPHY
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369
Oceanography and marine geophysics in Indian and Pacific Oceans
[AD-742342] N72-32423
Calibration and maintenance of equipment designed to monitor meteorological and oceanographic parameters for navigation buoys
[AD-742659] N72-32426

OCEANS
Relationships between wave height and period, and wind field characteristics in Bass Strait, Australia
N72-32404

OGO-F
Neutral density data from OGO-F and geomagnetic storms
[NASA-CR-122479] N72-32390
Analytic solution to complete Fokker-Planck equation of solar particle events based on OGO-F data
[NASA-CR-128295] N72-32777
Reduction and analysis of OGO-6 data from neutral atmosphere composition experiment
[NASA-CR-130058] N72-32813

OIL SLICKS
Military navigation satellite time dissemination, dolphin acoustics, biodegradation of crude oil by marine microorganisms, and research notes
N72-32970

ON-LINE PROGRAMMING
Computer-aided evaluation of reconnaissance image compression schemes, using on-line interactive facility
[AD-743860] N72-32191
ONBOARD EQUIPMENT
Modification of onboard data management system software to multiprocessor fault tolerant system
[NASA-CR-128553] N72-32211
ONE DIMENSIONAL FLOW
Partial differential equations for describing one-dimensional gas dynamics problems
[AD-743579] N72-32322
OPERATIONS RESEARCH
Long range planning and analyses applied to social impact of short takeoff and landing operations in urban areas
[NASA-CR-128197] N72-32016
Operational procedures for each alternate approach for each interfacing activity of orbital operations study - Appendix B
[NASA-CR-128202] N72-32802
Orbital operations study to include generic mission models, element pair interactions, and interfacing activities - Executive Summary
[NASA-CR-115726] N72-32804
OPERATOR PERFORMANCE
Measurement of human operator performance in single axis tracking task during simulated turbulent conditions
N72-32034
OPERATORS [MATHEMATICS]
Axisymmetric die in contact with viscoelastic half space and noncommutative operators
[NRC-TT-1572] N72-32909
OPTICAL EQUIPMENT
Scale model of big telescope on altazimuth mounting and arrangement of control system
[NLL-RTS-7354] N72-32450
Borescope with adjustable hinged telescoping optical system
[NASA-CASE-MFS-15162] N72-32452
OPTICAL FILTERS
Theory of Fabry-Perot interferometer with flat mirrors and its use in measuring spectral line contours
[AD-744174] N72-32666
OPTICAL MEASURING INSTRUMENTS
Quality control of scatter plates for interferometric measurement of surface configurations of telescope mirrors and other optical components
[NASA-TM-X-64691] N72-32473
Computing operating range of active night vision devices
N72-32656
OPTICAL PROPERTIES
Effect of solarization on lasing properties of glass
[AD-744225] N72-32537
Preparation and optical and electrical properties of vanadium oxide single crystals and films
[AD-744319] N72-32735
OPTICAL PUMPING
Efficient optical pumps using xenon lamp with clad erbium silicate glass laser material
[AD-744480] N72-32532
Theory of Fabry-Perot interferometer with flat mirrors and its use in measuring spectral line contours
[AD-744174] N72-32666
OPTICAL PYROMETERS
Pyrometer for measuring surface temperature distribution on rotating turbine blade
[NASA-TM-X-68113] N72-32459
OPTICAL RANGE FINDERS
Design, development, characteristics, and evaluation of optical theodolites and range finders
[AD-744511] N72-32482
Computing operating range of active night vision devices
N72-32656
OPTICAL TRACKING
Application of atmospheric contrast transmission to visual detection and electro-optical lock-on problem
[AD-743560] N72-32192
OPTIMAL CONTROL
Fixed end point problem in optimal control theory
[AD-743795] N72-32595
OPTIMIZATION
Optimization methods for determining aerodynamic shapes of hypersonic transport vehicles
N72-31996
Analysis and testing of demultiplexer to determine feasibility and optimum method for modification for broadband operation
[NASA-CR-123825] N72-32172
Constructibly countable ordinals and gap minimality for well-ordered notation systems
[NASA-CR-128195] N72-32585
Optimization techniques for redesign and structural problems
[MATH-RES-9] N72-32903
Minimum weight elastic structure designs under dynamic loads
[NASA-TT-F-14540] N72-32904
ORBITAL ELEMENTS
Zonal geopotential to degree 21 based on mean orbital elements for 21 satellites
[NASA-TM-X-66039] N72-32402
Numerical analysis of orbital elements of celestial body
[NASA-TT-F-14444] N72-32832
ORBITAL MECHANICS
Orbital operations study to show interfacing activities, mission models, and potential interfacing element pairs - Vol. 1
[NASA-CR-128203] N72-32795
Interfacing activity analyses summary of orbital operations study - Vol. 2 Pt. 1
[NASA-CR-115721] N72-32796
Analysis of mating, orbital assembly, separation, payload deployment, and payload retraction for orbital operations study - Vol. 2 Pt. 2
[NASA-CR-115722] N72-32797
Support operations activity analysis of orbital operations study to include crew transfer, cargo transfer, propellant transfer, and attached element operations - Vol. 2 Pt. 4
[NASA-CR-115724] N72-32799
Orbital operations study to include generic mission models, element pair interactions, and interfacing activities - Executive Summary
[NASA-CR-115726] N72-32804
Development of approximate nonlinear theory for orbit estimation
[NASA-CR-127326] N72-32807
ORGANIC MATERIALS
Use of plasma cleaning and Auger spectroscopy to remove and monitor organic contamination on Viking spacecraft surfaces
[NASA-CR-128302] N72-32117
ORGANISMS
Marine bionics for duplicating biological systems and studying pattern recognition mechanisms in living organisms
[AD-742638] N72-32124
ORIFICES
Conic, square-edged orifice for turbulent flow in shipboard automatic control systems
[AD-743479] N72-32323
Growth of silicon thick films and application for fabrication of dies and orifices
[NASA-CR-128415] N72-32718
ORTHOTROPIC CYLINDERS
Thermal stresses in infinite, elastic, orthotropic cylinder under axisymmetric heating
[NASA-TT-F-14528] N72-32943
OSCILLATIONS
Free piston compressor for high pressure He, Na line broadening, and Fe I oscillator strength
[AD-744311] N72-32167
Specimen holder with vertical oscillation and rotation for determining preferred orientation in metals by X ray diffraction
[ARL/MET-81] N72-32468
Two types of motion in solar atmosphere
[AD-740233] N72-32789
Relaxation oscillations of system consisting of elastic fastened load moving along infinite belt with dry friction and viscous resistance
[AD-744261] N72-32925
OUTPUT
Simple modifications of NASTRAN program output compared with ASTRAL output
N72-32888
OVER-THE-HORIZON RADAR
Physical principles of over-the-horizon radar
[JPRS-56925] N72-32175
OXIDATION
Electron microprobe measurement of tungsten and molybdenum oxidation in oxygen atmospheres at low pressures and high temperature
[NASA-TT-F-14559] N72-32148
OXYGEN
Oxygen diffusion under conditions of cerebral hypoxia
[RAE-LIB-TRANS-1661] N72-32108
Electron microprobe measurement of tungsten and molybdenum oxidation in oxygen atmospheres at low pressures and high temperature
[NASA-TT-F-14559] N72-32148
Mass spectroscopy measurements of desorption of oxygen from tungsten by means of electron impact
[NASA-TT-F-14481] N72-32156
Atomic oxygen absorption cell system applied to absorption cross sections
[AD-744097] N72-32168
OXYGEN METABOLISM
Effect of vibration on relationship of bioelectric activity and oxygen demand in cerebrum of rats
[NASA-TT-F-14570] N72-32091
OZONE
Aerological ozone soundings at Hohenpeissenberg Meteorological Observatory from July through Dec. 1971
[AD-741882] N72-32612

P

P-N JUNCTIONS
Potential and charge distribution in surface film p-n junctions
[SRDE-71023] N72-32721
P-TYPE SEMICONDUCTORS
Current-voltage characteristics under load of p-type GaAs on n-type GaAs substrate prepared by liquid epitaxial growth
[NASA-TT-F-14592] N72-32075
PACIFIC OCEAN
Oceanography and marine geophysics in Indian and Pacific Oceans
[AD-742342] N72-32423
Cyclone intensity forecasting technique for Atlantic and Pacific
[NOAA-TM-NESS-42] N72-32607
Summary of synoptic meteorological observations of Japanese coastal marine areas including Central East China Sea, Northern East China Sea, and Nagasaki
[AD-743488] N72-32614
PAINTS
Painting schemes for improving rotating propeller and tail rotor visibility of military aircraft
[AD-744453] N72-32579
PALEONTOLOGY
Tree ring analysis and radiocarbon dating for determining paleoclimatology
[AD-744129] N72-32634
PANELS
Local buckling coefficients for panels with single- or double-flanged stringers
[ESDU-71014] N72-32861
NASTRAN finite element representation to predict vibration modes of panels
N72-32878
Vibration of thin flexible membrane at intermediate acoustic frequencies
[AD-743865] N72-32919
PARACHUTES
Subsonic wind tunnel tests to determine aerodynamic forces and pressure distribution on parachute canopy of ring-slot parachute model
[AD-744103] N72-32063
PARAMAGNETIC RESONANCE
Electron spin resonance analysis of yttrium oxides, cerium oxides, and thorium dioxide to determine parametric point defects in single crystals
[AD-744516] N72-32733
PARAMAGNETISM
Development of equipment for measuring magneto-optic rotation of ions in variety of glasses
[LA-4921] N72-32573
Magnetization and Mossbauer experiments giving evidence of superparamagnetism in quenched face centered cubic [gamma] phase of ternary Fe-C-V alloy, Viscalloy 2
[NASA-TM-X-68127] N72-32652
PARAWINGS
Design and development of ground to air self-rescue aircraft with vertical takeoff capability and seventy-five nautical mile cruise range
[AD-743477] N72-32059
PARTIAL DIFFERENTIAL EQUATIONS
Partial differential equations for describing one-dimensional gas dynamics problems
[AD-743579] N72-32322
Partial differential equation solution for fourth moment of two dimensional plane wave propagating in random medium and multiscatter theories applied to atmospheric turbulence
[AD-744122] N72-32668
PARTIAL PRESSURE
Partial pressures of C3 molecule, heat of formation, and entropy
[AD-744046] N72-32162
PARTICLE BEAMS
Energetic neutral particle beams for filling and heating fusion devices
[ORNL-TM-3788] N72-32687
PARTICLE COLLISIONS
Divergence of total cross section for three body rearrangement collisions with Coulomb interactions
[NASA-TM-X-66054] N72-32682
PARTICLE DENSITY [CONCENTRATION]
Numerical analysis to determine magnitude and kinetics of samples of suspensions from particle deposition and erosion
[WAPD-TM-1014] N72-32421
PARTICLE DIFFUSION
Numerical analysis to determine magnitude and kinetics of samples of suspensions from particle deposition and erosion
[WAPD-TM-1014] N72-32421
Explicit expression for Mie phase matrix in 4-component Stokes vector representation for system containing polydispersion of spherical particles
[NASA-CR-128174] N72-32775

PARTICLE INTERACTIONS
Quantum mechanics and high pressure experiments on hydrogen molecule interaction
[UCRL-73846] N72-32159
PARTICLE SIZE DISTRIBUTION
Calculation of supersaturation and drop size distribution in stratiform clouds, and turbulent diffusion effects
[NLL-RTS-7058] N72-32599
Asymptotic size distribution of large drops in stratiform clouds, and turbulent diffusion effects on distribution
[NLL-RTS-7060] N72-32601
Hailstone diameter distribution and design criteria
[AD-743831] N72-32624
PARTICLE THEORY
Summaries of research in particle technology N72-32672
PARTITIONS [MATHEMATICS]
Transport phenomena, temporal correlation functions, and partition functions
[CEA-R-3597] N72-32593
PASSENGERS
Improvement of passenger comfort in railway cars
[RAE-LIB-TRANS-1630] N72-32965
Optimization model for designing surface and air intercity passenger transport systems, and application to STOL link between Toronto and Montreal
[TR-72-1] N72-32972
PATENTS
Exploiting unused NASA patents
[NASA-CR-128294] N72-32957
PATHOLOGY
Histopathology of argon, ruby, gallium arsenide, neodynium, and carbon dioxide laser induced retinal lesions
[AD-741380] N72-32127
PATTERN RECOGNITION
Marine bionics for duplicating biological systems and studying pattern recognition mechanisms in living organisms
[AD-742638] N72-32124
Mapping of areal geology in Kansas from ERTS-1 multispectral imagery, identification of anomalous patterns, and search for large scale ground patterns by spatial frequency analysis
[E72-10122] N72-32372
PATTERN REGISTRATION
Gain measurement of horn antenna using pattern integration and near-field gain correction evaluation
[NASA-CR-128299] N72-32232
PAVEMENTS
Similitude requirements for application of scale model theory to design and evaluation of airfield pavements
[AD-741368] N72-32281
Finite element theory of elastic layered analysis for airfield pavement overlay design
[AD-742337] N72-32916
PENNING DISCHARGE
Analysis of ion heating mechanism in modified Penning discharge
[NASA-TN-D-6985] N72-32695
PERFORMANCE
Dynamic characteristics and performance of thin film integrated magnetic recording head
[CEA-R-4164] N72-32187
PERFORMANCE PREDICTION
Development of mathematical models for estimating takeoff distance over barriers between thirty and fifty feet high
[EG-5/1-AMEND-A] N72-32014
Analysis of methods for predicting aircraft performance and recommendations for computer programs to provide accurate prediction capability N72-32036
Ground trainer in job sample approach to predicting pilot performance
[AD-741747] N72-32142
Method for evaluation of operational and functional performance characteristics of landing mats
[AD-741857] N72-32278
Development of procedures for predicting performance of materials in components and structures with application to decisions for specific designs
[AD-743991] N72-32920
PERFORMANCE TESTS
Interrelationship of parameters involved in developing reliability test requirements for military helicopters - Vol. 2
[AD-741377] N72-32053
Sensitivity analysis applied to helicopter development reliability test requirements - Vol. 3
[AD-742247] N72-32054
Effects of variations in stability derivatives on performance of XV-4 aircraft
[AD-744104] N72-32066
Design and operation of first-stage and two-stage of small, low cost turbofan engine to determine specific work, torque, mass flow, and efficiency
[NASA-TN-D-6967] N72-32072
PERIODIC VARIATIONS
Influence of biological rhythm on daily periodical hearing in person subjected to prolonged noise
[NASA-TT-F-14568] N72-32089
White Sands Missile Range climate calendar covering mean daily minimum, maximum, and extreme temperature from 1950 to 1971
[AD-743842] N72-32621
Effect of start reaction on temporal variation of combustible gas conditions
[NASA-TT-F-14555] N72-32940
PERITONEUM
Intraperitoneal administration of physiological solution as alternative method for hydrating human body
[NASA-TT-F-14574] N72-32103
PERMAFROST
Remote sensing of permafrost and geologic hazards in Alaska using ERTS-1
[E72-10060] N72-32333
PERTURBATION THEORY
Coupled-mode equations for wave propagation in medium modulated by multiple-frequency traveling wave studied with many-space-scale perturbation theory
[AD-743861] N72-32664
Numerical experiences concerning perturbation in celestial mechanics, using spinor regularization
[NASA-TT-F-14445] N72-32828
Perturbation solution of deceleration trajectory in ballistic reentry in moving atmosphere
[PB-208108] N72-32858
PH FACTOR
PH dependent inhibition and reactivation of angiotensin 2 A and angiotensin 2 H and EDTA angiotensinases inhibition in amide cleaving enzymes of human blood plasma
[NASA-TT-F-14457] N72-32118
PHASE LOCKED SYSTEMS
Coherent combining of angle-modulated signals using phase lock loops
[AD-744085] N72-32202
PHASE TRANSFORMATIONS
Laser light scattering spectroscopy used for analysis of phase transition phenomena
[AD-744532] N72-32536
PHENOLOGY
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
PHENOLS
Comparative wear resistance of metal, phenols, and polyamide coatings
[AD-743825] N72-32558
PHOENIX QUADRANGLE [AZ]
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361
PHONOCARDIOGRAPHY
Quantitative analysis of phonocardiograms by electronic computers
[NASA-TT-F-14608] N72-32113
Diagnosis of heart disease by hybrid computer from phonocardiogram data
[NASA-TT-F-14588] N72-32114
PHOSPHATES
Alkaline phosphate activity of adrenocortical cells in tailed newts
[NASA-TT-F-14577] N72-32104
PHOTOELASTIC ANALYSIS
Factors affecting data from photoelastic stress freezing for stress concentration near crack tips
[AD-742662] N72-32915
PHOTOGRAMMETRY
Aerial photogrammetric surveys of sea otter abundance and distribution at Amchitka Island, Alaska
[BMI-171-135] N72-32422
Long term scientific forecasting of trends in photogrammetry and geodesy
[AD-744347] N72-32444
Potential impact of ERTS, Skylab, and other remote sensing data on cartography and photogrammetry programs in Canada
[M75-2/4] N72-32448
PHOTOGRAPHIC EQUIPMENT
Apollo experience report on photographic equipment and operations during manned space flight programs
[NASA-TN-D-6972] N72-32852
PHOTOGRAPHIC FILM
Analysis of photographic intermittency effect and explanation of inconsistencies in photographic images
[RAE-LIB-TRANS-1595] N72-32461
PHOTOGRAPHIC PROCESSING
Analysis of photographic intermittency effect and explanation of inconsistencies in photographic images
[RAE-LIB-TRANS-1595] N72-32461
PHOTOGRAPHIC RECORDING
Analysis of photographic intermittency effect and explanation of inconsistencies in photographic images
[RAE-LIB-TRANS-1595] N72-32461
PHOTOINTERPRETATION
Man-made culture interpretation and culture revision of small-scale maps using ERTS-1 multispectral imagery
[E72-10098] N72-32351
PHOTOIONIZATION
Measurement of cosmic X rays in region of 20 eV to 1 keV with argon proportional counter photoionization device
[NASA-CR-130064] N72-32786
PHOTOLUMINESCENCE
Photoluminescence study of germanium using neodymium laser
[AD-743566] N72-32529
PHOTOMAPPING
Cartographic applications of ERTS-1 return beam vidicon imagery
[E72-10092] N72-32345
Photomapping of US using ERTS-1 return beam vidicon imagery
[E72-10108] N72-32360
Land use mapping and modeling for Phoenix quadrangle using ERTS-1 multispectral photography
[E72-10109] N72-32361
PHOTOMETRY
Interstellar reddening law in far ultraviolet determined from OAO 2 satellite filter photometry
[NASA-TM-X-66055] N72-32840
PHOTOSENSITIVITY
Calibrating photosensitive devices in ultraviolet range of 1022 to 2500 A
[NASA-TN-D-6991] N72-32474
PHYSICAL FITNESS
Effects of prolonged wideband noise on functional condition of human organism
[NASA-TT-F-14567] N72-32088
PHYSICAL PROPERTIES
Thermophysical properties of arc-cast tungsten and MOD 3 carbon to 2600 K
[AD-743976] N72-32559
Chemical, mechanical, and physical properties of surface treated carbon fibers
[AD-743469] N72-32577
PHYSICAL WORK
Measurement of arrhythmia in relation to physical and mental work loads
[RAE-LIB-TRANS-1586] N72-32092
PHYSIOLOGICAL EFFECTS
Effects of prolonged bed rest on physical work capacity, tilt-table tolerance, and urinary calcium excretion
[NASA-TT-F-14342] N72-32085
Hazards of bed rest as therapeutic measure
[NASA-TT-F-14349] N72-32116
Data systems for studying hyperbaric physiology of human and animal subjects
[AD-744053] N72-32129
Physiological effects of laser radiation and safety precautions followed during laboratory experiments
[JPRS-57029] N72-32516
PHYSIOLOGICAL RESPONSES
Measurement of arrhythmia in relation to physical and mental work loads
[RAE-LIB-TRANS-1586] N72-32092
Effect of space flight on changes in blood composition and body functions
[NASA-TT-F-14535] N72-32139
PHYSIOLOGY
Intraperitoneal administration of physiological solution as alternative method for hydrating human body
[NASA-TT-F-14574] N72-32103
PIEZOELECTRIC TRANSDUCERS
Mathematical models for analyzing structural-acoustic interactions in metal-ceramic piezoelectric transducers
[AD-743985] N72-32236
PIEZOELECTRICITY
Linear equations of piezoelectromagnetism for thickness-shear vibrations of quartz plate
[AD-744312] N72-32254
Development and application of circular piezoelectric bender laser tuner to replace conventional laser tuners
[NASA-TM-X-66040] N72-32515
PILOT PERFORMANCE
Development of schematic representation of pilot workload and functions for various portions of aircraft flight and reaction to various stimuli N72-32035
Neurological effects of drug isoniazid on pilot performance
[AD-744808] N72-32119
PILOT SELECTION
Ground trainer in job sample approach to predicting pilot performance
[AD-741747] N72-32142
PILOT TRAINING
Effect of flight stress on blood clotting in fighter pilots
[NASA-TT-F-14455] N72-32109
PILOTS [PERSONNEL]
Effect of maneuvers and flight conditions on helicopter pilot eye movements
[AD-742276] N72-32130
PIPES [TUBES]
Ultrasonic inspection of weldment in high pressure, high temperature tube
[TR-7205.584] N72-32494

Results of ultrasonic inspection of wall thickness along length of forged steel pipe
[TR-7205.585] N72-32543

PLANE WAVES
Reflection, transmission, and absorption coefficients for plane wave incident on plasma layer
[EUR-CEA-FC-627] N72-32703

PLANETARY ATMOSPHERES
Operation of power plant on planet utilizing atmosphere as working fluid
[NASA-TT-F-14505] N72-32074
Course lectures and seminar abstracts on planetary atmosphere dynamics
[PB-208567] N72-32430
Research lectures on planetary atmosphere dynamics
[PB-208568] N72-32431
Analysis of brightness data for planets Saturn and Uranus to determine occurrence of maximum and minimum brightness
[NASA-TT-F-14419] N72-32836

PLANETARY GRAVITATION
Analysis of error covariance matrices for accuracy in determining gravitational coefficients of Mars gravitational potential function
[NASA-TN-D-6949] N72-32834

PLANETARY MAGNETIC FIELDS
Model for calculation of synchrotron emission from high energy electrons in planetary Van Allen belts
[NASA-TM-X-66015] N72-32781

PLANETARY RADIATION
Development of model of radioemission characteristics of planet Uranus
[NASA-TT-F-14454] N72-32831
Analysis of brightness data for planets Saturn and Uranus to determine occurrence of maximum and minimum brightness
[NASA-TT-F-14419] N72-32836

PLANTS [BOTANY]
Density and distribution of phreatophytes and other arid land plant communities studied using ERTS-1 imagery
[E72-00114] N72-32365

PLASMA ACCELERATION
Coaxial, high density, hypervelocity plasma generator and accelerator using electrodes
[NASA-CASE-MFS-20589] N72-32688

PLASMA ACCELERATORS
MPD arc thrustors operating in quasi-steady mode and using electrode vapor for propellant
[NASA-CR-112144] N72-32691

PLASMA CONTROL
Plasma containment and density decay curves
[UCRL-51208] N72-32706

PLASMA DIAGNOSTICS
Transition region response of symmetric double probe and application in lower ionosphere
[NASA-TM-X-66013] N72-32400
Comparative study of electrical probe techniques for plasma diagnostics
[NASA-TM-X-66014] N72-32692
Hydrodynamic description of plasma based on rapid isotropization of arbitrary particle distribution in case where no macromotion exists
[NASA-TT-F-14599] N72-32696
Turbulent plasma diagnostics and oscillations
[NP-19262] N72-32702
Abstracts of conference papers on magnetohydrodynamic stability, plasma generators, and plasma diagnostics
[NYO-3077-185] N72-32707
Plasma study, using lasers with high frequency stability, narrow beam directivity, and high power
[AD-742639] N72-32708

PLASMA DYNAMICS
Analysis of sixty element per linear inch plasma display/memory device for use in military aircraft
[AD-744096] N72-32069
Hydrodynamic description of plasma based on rapid isotropization of arbitrary particle distribution in case where no macromotion exists
[NASA-TT-F-14599] N72-32696
Research reports on fluid mechanics and plasma dynamics
[AD-744533] N72-32713

PLASMA GENERATORS
Production of plasmas by laser spark, and thermonuclear fusion
[NASA-TT-F-14465] N72-32518
Observation of plasma formation and plasma jet shaping during laser action on metals
[NASA-TT-F-14476] N72-32520
Coaxial, high density, hypervelocity plasma generator and accelerator using electrodes
[NASA-CASE-MFS-20589] N72-32688
Abstracts of conference papers on magnetohydrodynamic stability, plasma generators, and plasma diagnostics
[NYO-3077-185] N72-32707

PLASMA HEATING
Analysis of ion heating mechanism in modified Penning discharge
[NASA-TN-D-6985] N72-32695

PLASMA INTERACTIONS
Asymptotic series analysis of interaction between electrostatic probe and weakly ionized plasma
[AD-744100] N72-32710

PLASMA JETS
Observation of plasma formation and plasma jet shaping during laser action on metals
[NASA-TT-F-14476] N72-32520

PLASMA OSCILLATIONS
Integral equation for characteristic oscillations of sheet plasma
[IPPT-132] N72-32694
Turbulent plasma diagnostics and oscillations
[NP-19262] N72-32702

PLASMA PHYSICS
Medium energy physics research, including engineering support, accelerator systems, and electronic instrumentation
[LA-4899] N72-32267
Ionospheric heating analysis with determination of HF plasma line enhancements
[AD-744523] N72-32446
Solid state, plasma, and high energy research
[NP-19250] N72-32685
Reflection, transmission, and absorption coefficients for plane wave incident on plasma layer
[EUR-CEA-FC-627] N72-32703
Computerized simulation for plasma physics
[MATT-894] N72-32704

PLASMA SHEATHS
Potential double layer sheaths in upper ionosphere
[TRITA-EPP-71-14] N72-32420

PLASMA TURBULENCE
Physical mechanisms responsible for plasma turbulence and conditions for energy exchange and transfer
[NASA-CR-128297] N72-32689
Spectrum of turbulence associated with magnetic pulsations of nonisothermal plasmas
[NP-19291] N72-32701
Turbulent plasma diagnostics and oscillations
[NP-19262] N72-32702

PLASMAS [PHYSICS]
Parametric processes and combination scattering of electromagnetic waves on plasmons in turbulent plasma excited by flux of charged particles in polar ionosphere
[NASA-TT-F-14589] N72-32414
Transport and radiation properties of plasmas
[AD-744518] N72-32714

PLASMONS
Parametric processes and combination scattering of electromagnetic waves on plasmons in turbulent plasma excited by flux of charged particles in polar ionosphere
[NASA-TT-F-14589] N72-32414

PLASTICS
Development of heat resistant plastics and application to aerospace industry products
[AD-744190] N72-32583

PLATES [STRUCTURAL MEMBERS]
Numerical solution to problem of supersonic flow around corner formed by two perpendicular plates
[NASA-TT-F-14537] N72-32301
Methods for solving problems on stressed state of isotropic sandwich plates and shells with rigid or light fillers
[AD-744177] N72-32931

PLAYAS
Utilization of ERTS-1 photography for evaluation of Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352

PLOTTERS
NASTRAN contour plotter, group of subroutines and modifications to plot module
N72-32891

PLUMES
Evaluation of suspended sediment plumes in Lake Ontario based on ERTS-1 imagery
[E72-10110] N72-32362

PLUTONIUM ISOTOPES
Tissue equivalent human phantoms used to measure radiation dose rate of prototypic plutonium circulatory support heat sources
[BNWL-SA-4121] N72-32123

POINT DEFECTS
Electron spin resonance analysis of yttrium oxides, cerium oxides, and thorium dioxide to determine parametric point defects in single crystals
[AD-744516] N72-32733

POLAND
Polish space program activities, and medical and biocybernetics research in Albania and Poland
[JPRS-56928] N72-32814

POLAR ORBITS
Characteristics of Timation 3 circular polar orbit, and suitability of using laser ranging observations of Timation 3 for studies of earth geodynamics
[NASA-TM-X-66012] N72-32851

POLAR REGIONS
Mapping in polar regions using ERTS-1 return beam vidicon imagery
[E72-10102] N72-32355
Annotated bibliography on upper atmosphere phenomena in polar regions
[AD-743952] N72-32424
Past and current research on upper atmosphere over polar regions - bibliography
[AD-744090] N72-32440
OGO 4 data on low energy electron precipitation in polar magnetosphere, and latitude and local time dependence
[NASA-TM-X-66035] N72-32783

POLARIZATION [WAVES]
Solar mapping data acquisition, and brightness-temperature and polarization data
[AD-742235] N72-32792

POLICIES
National transportation policy and problem solving actions, and specific administration reports
[AR-1] N72-32985

POLYAMIDE RESINS
Comparative wear resistance of metal, phenols, and polyamide coatings
[AD-743825] N72-32558

POLYMERIZATION
Gelification of multifunctional macromolecular system
[NASA-TT-F-14487] N72-32152
Classical expressions attributing infinite value to mean degree of polymerization
[NASA-TT-F-14486] N72-32153

POLYNOMIALS
Relation between systems of polynomials orthogonal with respect to distribution functions
[NASA-TT-F-14480] N72-32592

POLYTETRAFLUOROETHYLENE
Adhesion and transfer of polytetrafluoroethylene to metals, and Auger emission spectroscopy
[NASA-TN-D-6983] N72-32571

POLYWATER
Research on anomalous water in USSR and abroad
[JPRS-57043] N72-32149

POSITION [LOCATION]
Tracking ATS 3 by very long baseline interferometer observations
[NASA-TM-X-66018] N72-32263
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376

POSTURE
Effects of posture on decompression and hypoxic stress recovery induced by emergency descent of high altitude/multi-Mach transport aircraft
[AD-741686] N72-32131

POTASSIUM CHLORIDES
Migration of aluminum crystallites on KCl substrates
[NASA-TT-F-14459] N72-32717

POWDER [PARTICLES]
Detection sensitivity of nonconductive powder samples in laser emission spectrography
[NASA-TT-F-14478] N72-32519

POWDER METALLURGY
Flow geometry of powder metallurgical flow control devices
[SCL-DR-710351] N72-32319
Effects of graphite in powder alloy materials on friction and wear properties
[AD-744141] N72-32505

POWDERED ALUMINUM
Formation of aluminum powder for propellant grains by rounding random shaped particles in fluid energy mill operating on inert gas
[AD-743484] N72-32744

POWER GAIN
Array method for reducing ground losses in high frequency antenna communication system
[AD-744469] N72-32247

POWER PLANTS
Operation of power plant on planet utilizing atmosphere as working fluid
[NASA-TT-F-14505] N72-32074

POWER SPECTRA
Interplanetary magnetic field power spectrum and cosmic ray diffusion
[NASA-TM-X-66019] N72-32782

PREDICTION ANALYSIS TECHNIQUES
Waverider prediction of hypersonic behavior of wing planforms
N72-31997

PREDICTIONS
Prediction of chemical reaction kinetics in laboratory for studies of atmosphere
[LBL-497] N72-32160

PREGNANCY
Lymphoblastic transformation test for studying immunity of pregnant women
[NASA-TT-F-14591] N72-32106

PRESSURE DISTRIBUTION
Development of procedures for calculating pressure distribution on airfoil in sonic stream
[ESDU-69013] N72-31989
Wind tunnel tests to determine path of vortex moving from each rotor blade tip of helicopter rotor to establish effect on aerodynamic forces and pressure distribution
[NASA-TT-F-14462] N72-32012

Subsonic wind tunnel tests to determine aerodynamic forces and pressure distribution on parachute canopy of ring-slot parachute model
[AD-744103] N72-32063
Wind tunnel wall corrections for two-dimensional flow applied to pressure distribution measurements in transonic wind tunnel
[NASA-TT-F-14316] N72-32264
Development of equation for determining pressure of spherical drop colliding at right angles with plane rigid surface
[RAE-LIB-TRANS-1652] N72-32308
Total pressure averaging in pulsating flows of turbomachine type
[NASA-TM-X-68128] N72-32316
Experimental and theoretical determination of pressure distribution in lubricant layer of gas static bearing
[AD-744294] N72-32512

PRESSURE EFFECTS
Effects of ambient air pressures on spray characteristics of swirl type injectors
[NLL-RTS-7250] N72-32287
Characteristics of sonic booms and damage caused to buildings due to supersonic overflights
[NTID300.12] N72-32913

PRESSURE VESSELS
Buckling analysis of two-lobed circular arc pressure vessel
N72-32873
Computer derived damage functions for engineering of reactor vessel steel embrittlement caused by neutron irradiation, and research progress notes
N72-32977

PRETREATMENT
Effects of various pretreatments on microstructural stability of austenitic stainless steels from 550 to 750 C
[ORO-4044-2] N72-32556

PRIORITIES
NASTRAN management, research and development, and priorities
N72-32868

PROBABILITY THEORY
Proof of impossibility theorem for group probability functions
[P-4862] N72-32589

PROBLEM SOLVING
Equivalent equation to problems of gas lubricated bearings
[AD-744264] N72-32509
Estimation of errors for approximate solutions of system of first order differential equations
[NASA-TT-F-14432] N72-32591
NASTRAN applied to nuclear problems, including one physics and two engineering problems
N72-32896
National transportation policy and problem solving actions, and specific administration reports
[AR-1] N72-32985

PRODUCT DEVELOPMENT
High strength alloy and processing procedure for cast air cooled blades used in gas turbines
[AD-744109] N72-32567

PROGRAMMING LANGUAGES
Space programming language machine architecture study, including SPLM
[AD-743015] N72-32217

PROJECT MANAGEMENT
Detailed examination of human engineering design standard MSFC-STD-267A for manned spacecraft design and recommendations for improvement of standard for future missions
[NASA-CR-61393] N72-32846
Interdisciplinary study of project management in Apollo program
[NASA-CR-126941] N72-32954

PROPAGATION
Characteristic equations for elastic wave propagation
[NASA-CR-128216] N72-32910

PROPELLANT BINDERS
Reserach in developing polymeric binder for advanced solid propellant
[NASA-CR-128300] N72-32743
Production methods used for producing hydrocarbon polymeric binder for solid rocket propellants
[NASA-CR-128414] N72-32767

PROPELLANT CHEMISTRY
Production methods used for producing hydrocarbon polymeric binder for solid rocket propellants
[NASA-CR-128414] N72-32767

PROPELLER BLADES
Painting schemes for improving rotating propeller and tail rotor visibility of military aircraft
[AD-744453] N72-32579

PROPORTIONAL COUNTERS
Design studies for X ray experiment using solid state detectors or proportional counter for exploring magnetospheres of Saturn and Jupiter and cosmic X ray sources
[NASA-CR-128250] N72-32455
Telescope with two plane proportional counters and semiconductor detector for recording small energy protons on intense beta background
[JINR-P13-6261] N72-32477-
Measurement of cosmic X rays in region of 20 eV to 1 keV with argon proportional counter photoionization device
[NASA-CR-130064] N72-32786

PROPULSION
Propulsion of hypersonic vehicles
[AGARD-LS-42-VOL-2] N72-32749
Propulsion mode for hypersonic vehicles
N72-32750
Statoreactors for hypersonic aircraft, satellite launch vehicles, and missiles
N72-32752
Atmospheric propulsion, space shuttles, aeroelasticity, and aerodynamic heating
N72-32753

PROPULSION SYSTEM PERFORMANCE
Aerodynamic drag and hypersonic aircraft propulsion
N72-32000
Flow model used to determine factors influencing effective specific impulse of external nuclear pulse propulsion systems
[NASA-TN-D-6984] N72-32764
Engine firing tests of Centaur launch vehicle to evaluate pressurized propellant feed system
[NASA-TN-D-6876] N72-32856

PROTEIN METABOLISM
Effect of continuous noise and vibration on carbohydrate, fat, and protein metabolism in white rats
[NASA-TT-F-14569] N72-32090

PROTEINS
Estimation of amino acid and protein composition by pyrolysis gas chromatography
[NASA-TT-F-14483] N72-32151

PROTON ENERGY
Atmosphere Explorer C and D measurements of energy input into upper atmosphere due to electrons and protons in energy range 0.2 to 25 keV
[NASA-TM-X-66051] N72-32683

PSYCHOLOGICAL FACTORS
Performance of subjects with different cognitive complexity during negotiation in bilateral mode, with mediation, and in presence of observer
[NASA-TT-F-14482] N72-32110

PSYCHOMOTOR PERFORMANCE
Graf driving machine for determining sobering effect of caffeine and pervitin on intoxicated individual
[NASA-TT-F-14564] N72-32099
Effect of isoniazid on psychomotor performance of aviator instructors
[AD-728823] N72-32120

PSYCHOPHYSIOLOGY
Psychological verification of digitally simulated models of human visual system
[AD-742431] N72-32132

PULSARS
Theoretical analysis of pulsar gravitation and starquakes to explain period breakdown of pulsars
[NASA-TT-F-14485] N72-32826

PULSE AMPLITUDE
Amplitude and phase variance of optical signal propagating over folded laser path
[AD-743850] N72-32527
Computer controlled, dual parameter, pulse height analyzer for solid state laser emission
[AD-743459] N72-32530

PULSE DURATION
Effect of various magnesium salts on luminous intensity and duration in phosphorescent bacteria
[NASA-TT-F-14431] N72-32112

PULSE GENERATORS
Design of high voltage pulse generator based on circuit for forming trapezoidal shaped pulses
[AD-744154] N72-32481

PULSE MODULATION
Design and operation of completely implantable three channel temperature biotelemetry system
[BNWL-SA-4231] N72-32141

PYROLYSIS
Estimation of amino acid and protein composition by pyrolysis gas chromatography
[NASA-TT-F-14483] N72-32151
Thermal decomposition products of cellulose, and extraction and classification of pyrolysis derivatives
[NASA-TT-F-14503] N72-32154
Proceedings of conference on solid state physics, fracture mechanics, composite materials, liquid metals, and infrared optical materials - Vol. I
[AD-744204] N72-32564

Q

Q SWITCHED LASERS
Q switched laser beam as ion source for pulsed neutron generator
[CEA-R-4273] N72-32523

QUALIFICATIONS
Method for obtaining hardware qualification for flight without using qualification tests
[NASA-CR-123831] N72-32843

QUALITY CONTROL
Quality control of scatter plates for interferometric measurement of surface configurations of telescope mirrors and other optical components
[NASA-TM-X-64691] N72-32473

QUANTITATIVE ANALYSIS
Quantitative analysis of phonocardiograms by electronic computers
[NASA-TT-F-14608] N72-32113

QUANTUM MECHANICS
Quantum mechanics and high pressure experiments on hydrogen molecule interaction
[UCRL-73846] N72-32159

QUANTUM THEORY
Approximate quantum theory of radiation of fast electrons in magnetic field
[NASA-TT-F-14450] N72-32676
Order and value of quantum corrections to total radiation intensity of fast electrons in magnetic field
[NASA-TT-F-14451] N72-32677

QUARTZ
Linear equations of piezoelectromagnetism for thickness-shear vibrations of quartz plate
[AD-744312] N72-32254
Penetration of thin aluminum plate by quartz simulating micrometeoroid penetration and dense aluminum plasma expansion
[NASA-CR-123830] N72-32690

QUEUEING THEORY
Maximum throughput rate for runway serving single stream of landing aircraft
[AD-744481] N72-32648

R

RABBITS
Influence of magnesium narcosis on rabbit body temperature
[NASA-TT-F-14550] N72-32097

RADAR ECHOES
Radar reflectors as meteorological rawin radar targets
[AD-743457] N72-32626

RADAR EQUIPMENT
Time domain reflectometer as closed loop, one-dimensional radar system
[NASA-CR-128198] N72-32460

RADAR TARGETS
Backscattering from moving radar target in forested areas
[AD-744049] N72-32189
Technique to generate nondispersive, continuously variable microwave time delay for simulation of approach of radar to target
[AD-744242] N72-32286
Radar reflectors as meteorological rawin radar targets
[AD-743457] N72-32626

RADIAL DISTRIBUTION
Radial distribution of charged particle flux in extensive air showers
[INR-1345] N72-32686

RADIANT FLUX DENSITY
Meteor spectrograms used to determine intensity distributions at various points of trajectory
[NASA-TT-F-14490] N72-32819

RADIATION AND METEOROID SATELLITE
Development of computer programs for reducing data obtained from Radiation and Meteoroid Satellite mission
[NASA-CR-128535] N72-32833

RADIATION BELTS
Model for calculation of synchrotron emission from high energy electrons in planetary Van Allen belts
[NASA-TM-X-66015] N72-32781

RADIATION DAMAGE
Ruby laser test facility for conducting laser induced damage experiments with single subnanosecond pulses
[AD-744075] N72-32534
Single crystal semiconductors and devices and radiation sensitivity of amorphous semiconductors
[AD-743834] N72-32724
Infrared absorption spectra measurements of n-type silicon samples following irradiation to define zero-phonon lines and phonon-assisted sideband structure
[AD-743987] N72-32725
Effect of ionizing radiation on field effect transistors
[AD-744093] N72-32732

RADIATION DOSAGE
Radiation dosage distribution and effects
[ANL-7860-PT-2] N72-32140

RADIATION EFFECTS
Effect of gamma ray irradiation on chromosomes in human blood
[LIB/TRANS-366] N72-32122
Radiation dosage distribution and effects
[ANL-7860-PT-2] N72-32140
Physiological effects of laser radiation and safety precautions followed during laboratory experiments
[JPRS-57029] N72-32516

RADIATION INJURIES
Histopathology of argon, ruby, gallium arsenide, neodynium, and carbon dioxide laser induced retinal lesions
[AD-741380] N72-32127
RADIATION MEASURING INSTRUMENTS
Design of instrument based on Ulbrichts sphere for measuring UV radiation incident at arbitary angles
[NASA-TT-F-14416] N72-32470
Instrument with spherical attachment for measuring UV radiation at large incident angles
[NASA-TT-F-14418] N72-32471
Calibrating photosensitive devices in ultraviolet range of 1022 to 2500 A
[NASA-TN-D-6991] N72-32474
RADIATION SOURCES
Galactic X ray sources
[ASE-3066] N72-32784
Theoretical analysis of pulsar gravitation and starquakes to explain period breakdown of pulsars
[NASA-TT-F-14485] N72-32826
RADIATIVE HEAT TRANSFER
VIEW, modification of RAVFAC view factor program for NASTRAN thermal analyzer to simulate radiative heat transfer
N72-32898
Continuity equation for radiation transfer theory in nonhomogeneous medium
[NASA-TT-F-14443] N72-32947
RADIO ASTRONOMY EXPLORER SATELLITE
Radio Astronomy Explorer B satellite antenna aspect processor
[NASA-TM-X-66032] N72-32173
Simulation study to determine 136 MHz and 400 MHz noise temperature of ground antennas for tracking RAE-B during data transmissions
[NASA-TM-X-66047] N72-32184
RADIO BEACONS
Design, development, and application of flight recorders and crash location instruments used in NATO nations
[AGARD-AR-39] N72-32457
RADIO FREQUENCIES
Solid state RF amplifier design in frequency range 0.01 to 20 MHz
[CRC-1220] N72-32176
High voltage RF pulse supply for wide gap spark chamber
[EFI-ME-1[71]] N72-32684
RADIO FREQUENCY INTERFERENCE
Solid state RF amplifier design in frequency range 0.01 to 20 MHz
[CRC-1220] N72-32176
RADIO SOURCES [ASTRONOMY]
Analysis of techniques and procedures for determining existence of extraterrestrial intelligent life
[NASA-TM-X-68634] N72-32827
RADIO TELESCOPES
Sensitivity of radio telescope antennas and receivers
[NASA-TT-F-14441] N72-32469
RADIO WAVES
Propagation of radio waves through lower atmosphere of Venus and simplified model providing atmospheric attenuation factors
[NASA-TM-X-66046] N72-32185
RADIOACTIVE AGE DETERMINATION
Tree ring analysis and radiocarbon dating for determining paleoclimatology
[AD-744129] N72-32634
RADIOBIOLOGY
Literature survey and experimental results on morphological characteristics of biological action produced by magnetic fields
[AD-742513] N72-32126
RADIOGRAPHY
Computer enhancement of structural weld radiographs
[NASA-CR-123814] N72-32490
Radiographic study of structural changes of electrodes of annealed and deformed nickel or copper-nickel powders subjected to single spark discharge
[NLL-RTS-7269] N72-32538
RADIOMETERS
Background compensated X ray radiometric logging in nuclear geophysical investigations
[NLL-RTS-6739] N72-32451
Backscattering measurements from atmospheric aerosols using radiometer on Nimbus F satellite
[NOAA-TR-NESS-60] N72-32780
RADIOSONDES
High altitude wind and temperature measurement data from meteorological sounding rockets, and radiosonde observations - Dec. 1970
N72-32603
RADOMES
Microwave holography as diagnostic method for radomes, antennas, and wave propagation
[AD-744072] N72-32526
RAIL TRANSPORTATION
Test track with nine separate rail support structures on Atchison, Topeka, and Santa Fe Railway
N72-32875
Improvement of passenger comfort in railway cars
[RAE-LIB-TRANS-1630] N72-32965
Compendium of US ground, water, and air transportation statistics
N72-32966
Analysis of accomplishments in public transportation developments and predictions of future requirements
N72-32982
RAMAN SPECTRA
Raman and X ray spectroscopy of lunar glasses and scanning electron microscopy of lunar fines
[NASA-CR-128534] N72-32805
RAMJET ENGINES
Analysis of several air breathing jet engine systems using general thermodynamic approach based on physical-chemical conversions in gases and high temperatures - Vol. 1
[JPRS-57062-1-PT-1] N72-32757
Development of theory of ramjet and rocket-ramjet engine operation - Vol. 2
[JPRS-57062-2-PT-2] N72-32758
RANGE AND RANGE RATE TRACKING
Range rate errors due to specular and diffuse multipath for TDR satellite
[NASA-CR-130054] N72-32177
Range rate errors due to multipath reflection for TDR satellite
[NASA-CR-130056] N72-32181
Formula for correcting tropospheric error in range-rate satellite tracking data
[NASA-TM-X-66017] N72-32812
RANGE ERRORS
Formula for correcting tropospheric error in range-rate satellite tracking data
[NASA-TM-X-66017] N72-32812
RANGE RESOURCES
Prediction of ephemeral and perennial range quantity and quality during normal grazing season using ERTS-1 imagery
[E72-10090] N72-32343
RANGEFINDING
Range laws for distance measuring systems using frequency modulation with nonlinear triangular waveform
[AD-744483] N72-32196
Computing operating range of active night vision devices
N72-32656
RANGELANDS
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
RARE GASES
Rare gas effects on metabolism and inert gas narcosis
[NASA-CR-128213] N72-32083
RAREFIED PLASMAS
Rotating discontinuities in plasma with anisotropic pressure
[NASA-TT-F-14473] N72-32785
RAWINSONDES
Radar reflectors as meteorological rawin radar targets
[AD-743457] N72-32626
RAYLEIGH WAVES
Development of equations for describing conic pattern reradiated from crystalline surface for analysis of fault structure of crystalline material
[AD-744240] N72-32729
REACTION KINETICS
Prediction of chemical reaction kinetics in laboratory for studies of atmosphere
[LBL-497] N72-32160
Mass spectrometric search for polymers in carbon vapors and analysis of graphite vaporization kinetics
[AD-744494] N72-32165
Observation of plasma formation and plasma jet shaping during laser action on metals
[NASA-TT-F-14476] N72-32520
REACTION TIME
Effect of circadian variations in sleep-wake cycle on optical and acoustic stimuli reaction times
[RAE-LIB-TRANS-1668] N72-32093
REACTOR TECHNOLOGY
Computer derived damage functions for engineering of reactor vessel steel embrittlement caused by neutron irradiation, and research progress notes
N72-32977
READING
Circuit for eliminating reading ambiguities in digital measuring instruments
N72-32465
REAL GASES
Nonequilibrium real gas effects on lifting reentry aerothermodynamics of space shuttle vehicle
N72-32003
Computer program for calculating expansion tube flow quantities for real gas mixtures including comparison of program results with experimental data
[NASA-TN-D-6830] N72-32300
REAL TIME OPERATION
Algorithms for reducing real time digital processor for transceiver modulation and demodulation
[AD-744082] N72-32201
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359
RECEIVERS
Sensitivity of radio telescope antennas and receivers
[NASA-TT-F-14441] N72-32469
RECLAMATION
Application of remotely sensed ERTS-1 imagery to selected reclamation projects
[E72-10091] N72-32344
RECOIL PROTONS
Interactive computer graphics for on-line determination of neutron spectra from proton recoil distributions
[NASA-TM-X-68062] N72-32205
RECORDING INSTRUMENTS
Dynamic characteristics and performance of thin film integrated magnetic recording head
[CEA-R-4164] N72-32187
In flight monitoring system to measure and record helicopter performance in real time for all six degrees of freedom
[AD-745118] N72-32476
RECOVERABILITY
Recovery function in man after continuous military operations
[AD-741828] N72-32125
RECREATION
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - general findings and studies on international law, water resources management, and recreation
[NASA-CR-127335] N72-32974
RECTANGULAR PANELS
Design problems of fluid flow around rectangular blocks
[ESDU-71016] N72-32288
Method of estimating rms stress in stiffened skin panels subjected to random acoustic loading
[ESDU-72005] N72-32862
RECTANGULAR PLANFORMS
Numerical approximation of wave drag characteristics of rectangular planform fairings at zero degree incidence in supersonic flow
[ESDU-71018] N72-32289
RECTANGULAR WINGS
Calculating aerodynamic characteristics of lifting systems composed of rectangular wings arranged one behind other
N72-32007
Nonlinear theory of lifting surfaces applied to problem of forces acting on rectangular wing in stream of incompressible fluid
N72-32008
REDUCTION [CHEMISTRY]
Magnesiothermic reduction of subgroup 4A and subgroup 5A metals and alloys
[JPRS-57138] N72-32551
REENTRY PHYSICS
Effects of aerodynamic heating and flow patterns on hypersonic vehicle reentry
N72-32001
REENTRY VEHICLES
Computer program ASAAS for asymmetric stress analysis of axisymmetric solids and application to prediction of thermal stresses in reentry vehicle nosetip
[AD-743897] N72-32859
REFLECTOMETERS
Time domain reflectometer as closed loop, one-dimensional radar system
[NASA-CR-128198] N72-32460
REFLECTORS
Development of corrective transverse feed system for spherical reflectors to correct spherical aberrations and provide improved aperture efficiencies
[AD-744064] N72-32238
Scale model of big telescope on altazimuth mounting and arrangement of control system
[NLL-RTS-7354] N72-32450
REFRACTION
Refraction, shoaling, and friction of ocean waves reaching Port Phillip Heads, Australia
N72-32403
REFRACTIVITY
Effect of particle size on color of metals in colloidal state based on spheres with same refractive index and absorption coefficients
[NASA-TT-F-14477] N72-32550
Worldwide surface refractivity measurements at NASA spacecraft tracking sites for use in tropospheric modeling
[NASA-TN-D-6822] N72-32608
REFRACTORY METALS
Mechanical properties and defects in refractory, body-centered cubic metals
[IS-2773] N72-32553
REFRIGERATING
Refrigeration processes and radiation sensor refrigerating devices
[JPRS-57028] N72-32467

REFRIGERATING MACHINERY
Refrigeration processes and radiation sensor refrigerating devices
[JPRS-57028] N72-32467
REFRIGERATORS
Analysis of thermodynamic properties of gas refrigerator with zero dead volume
N72-32942
REGENERATION [ENGINEERING]
Gas regenerative cycle of low temperature unit and energy expenditure
N72-32945
REGENERATIVE COOLING
Nondestructive detection of bond defects in regenerative cooled thrust chamber walls
[NASA-CR-120980] N72-32502
REGRESSION ANALYSIS
Extraction of basin characteristics from ERTS-1 imagery for improving regression estimates of streamflow
[E72-10096] N72-32349
Generalized matrix inversion used for modification of differential correction schemes in nonlinear regression
[NASA-CR-2119] N72-32587
REGULATIONS
Procedures for application and revision of Federal Aviation Regulations in determining handling qualities and performance of aircraft
N72-32020
REINFORCED PLASTICS
Tribological characteristics of carbon fiber reinforced plastics, noting improved sliding wear against metal surfaces
[D-MAT-173] N72-32574
Low cycle fatigue tests to determine fatigue strength of glass-epoxy compounds in laminated configuration
[AD-744113] N72-32581
REINFORCING FIBERS
Development of stress analysis method for three dimensional fiber composite structure and optimization routine for selecting minimum weight structure
[AD-744505] N72-32580
RELATIVISTIC THEORY
Application of Treder ansatz to Buchner exact solution of Einstein unified field theory
[RIFP-154] N72-32657
RELAXATION [MECHANICS]
Relaxation oscillations of system consisting of elastic fastened load moving along infinite belt with dry friction and viscous resistance
[AD-744261] N72-32925
RELIABILITY ENGINEERING
Interrelationship of parameters involved in developing reliability test requirements for military helicopters - Vol. 2
[AD-741377] N72-32053
Sensitivity analysis applied to helicopter development reliability test requirements - Vol. 3
[AD-742247] N72-32054
Design and evaluation of reliable integrated termination devices
[AD-744476] N72-32245
Load-life model for calculating fatigue life and reliability of helicopter spur gear mesh
[AD-744504] N72-32507
Application of nondestructive testing techniques for improving aircraft safety and aircraft accident reduction
N72-32981
RELIEF MAPS
Characteristics and seasonal variation of prominent relief features at margin of Arctic coastal plain, Alaska
[AD-741354] N72-32429
REMOTE SENSORS
Multisensor data base for research and development
[AD-744088] N72-32195
Remote sensing of permafrost and geologic hazards in Alaska using ERTS-1
[E72-10060] N72-32333
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334
Application of remotely sensed ERTS-1 imagery to selected reclamation projects
[E72-10091] N72-32344
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350
Locating archaeological village sites in Alaska by ERTS-1 remote sensed imagery
[E72-10128] N72-32376
Global composition of stratosphere and mesosphere based on sounding rocket observations and satellite remote sensing techniques
[NASA-TM-X-66044] N72-32417
Potential impact of ERTS, Skylab, and other remote sensing data on cartography and photogrammetry programs in Canada
[M75-2/4] N72-32448
Spectrophotometry of earth surface from Soyuz 7 and 9 spacecraft data
N72-32466
Development of computer programs for reducing data obtained from Radiation and Meteoroid Satellite mission
[NASA-CR-128535] N72-32833
RENDEZVOUS
Data management analysis of orbital operations study to include communications, rendezvous, stationkeeping, and detached element operations - Vol. 2 Pt. 3
[NASA-CR-115723] N72-32798
RENDEZVOUS SPACECRAFT
Planning intercept missions to comets
[NASA-TM-X-66026] N72-32810
RESCUE OPERATIONS
Operation and maintenance procedures for fire rescue air pack
[NASA-CR-68614] N72-32135
RESEARCH
Utilization of ERTS-1 imagery and data as teaching and research tool in geology
[E72-10131] N72-32379
COSPAR activities in space research
N72-32959
RESEARCH AND DEVELOPMENT
Research and development in linear accelerator project
[COO-3058-11] N72-32268
Summaries of research in particle technology
N72-32672
Reserach in developing polymeric binder for advanced solid propellant
[NASA-CR-128300] N72-32743
NASTRAN management, research and development, and priorities
N72-32868
Research activities for various divisions of National Aeronautical Laboratory for 1970 - 1971
N72-32958
Research topics undertaken by Naval Research Laboratories
N72-32971
RESEARCH FACILITIES
Hearings before House Subcommittee on NASA oversight on real estate management and disposal, and excess land declarations at Lewis and Langley Research Centers and Wallops Island
N72-32964
Research topics undertaken by Naval Research Laboratories
N72-32971
RESEARCH PROJECTS
Review of research projects on aircraft handling qualities, vehicle stability, and control characteristics
N72-32038
Hydraulic research projects conducted at educational institute during fifty year period
[BULL-44] N72-32265
Research reports on fluid mechanics and plasma dynamics
[AD-744533] N72-32713
Research projects conducted by National Aerospace Laboratory of Netherlands during 1971
N72-32973
RESERVOIRS
Monitoring of reservoirs and water resources in Kansas using ERTS-1 imagery
[E72-10123] N72-32373
RESISTANCE THERMOMETERS
Measurement of soil temperatures in Antarctic regions using liquid and resistance thermometers and comparison of results
[NASA-TT-F-14471] N72-32408
RESONATORS
Modular waveguide assembly consisting of orthogonally intersecting transmission lines coupled by two ferrite resonators
[JPRS-57102] N72-32186
Beam monochromatization by resonator with ion-optical system
[JINR-P9-6252] N72-32266
RESOURCES MANAGEMENT
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339
Management of wildlife habitat in Alaska using ERTS-1 imagery data
[E72-10115] N72-32366
Application of ERTS-1 ecological, geological, and oceanographic imagery to Delaware coastal resources planning and management
[E72-10119] N72-32369
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - general findings and studies on international law, water resources management, and recreation
[NASA-CR-127335] N72-32974
RETINA
Histopathology of argon, ruby, gallium arsenide, neodynium, and carbon dioxide laser induced retinal lesions
[AD-741380] N72-32127
RETURN BEAM VIDICONS
Cartographic applications of ERTS-1 return beam vidicon imagery
[E72-10092] N72-32345
Thematic mapping based on ERTS-1 return beam vidicon imagery
[E72-10094] N72-32347
Cartographic evaluation of ERTS-1 orbit and attitude data based on return beam vidicon data
[E72-10100] N72-32353
Mapping in polar regions using ERTS-1 return beam vidicon imagery
[E72-10102] N72-32355
Photomapping of US using ERTS-1 return beam vidicon imagery
[E72-10108] N72-32360
REUSABLE SPACECRAFT
Analysis of factors governing structural design of reusable space shuttle booster to select optimum structural factors of safety
[NASA-CR-123837] N72-32845
REWARD [PSYCHOLOGY]
Group dynamics and alternative distribution of rewards
[AD-741176] N72-32143
RHOMBIC ANTENNAS
Effect of endfire rhombic antenna design on antenna radiation patterns
[AD-744091] N72-32249
RHYTHM [BIOLOGY]
Influence of biological rhythm on daily periodical hearing in person subjected to prolonged noise
[NASA-TT-F-14568] N72-32089
RIGID STRUCTURES
Cavitation erosion of rigid surfaces on impact with drops
[RAE-LIB-TRANS-1655] N72-32298
FORTRAN subroutine to NASTRAN for rigid structural dynamic problems
N72-32881
RING CURRENTS
Closed magnetic mirror development by self-field of trapped ring current
[ORNL-TM-3783] N72-32651
RING STRUCTURES
Design, fabrication, and testing of four power slip rings for synchronous orbit application
[NASA-CR-130063] N72-32230
RIOMETERS
Optical and riometer data from 6 to 10 March 1970 geophysical event
[AD-744074] N72-32439
RIVER BASINS
Extraction of basin characteristics from ERTS-1 imagery for improving regression estimates of streamflow
[E72-10096] N72-32349
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359
Study of ice break-up characteristics in Chena River Basin using ERTS-1 imagery
[E72-10135] N72-32383
ROBOTS
Application of human-like teleoperator machine and robots to various industrial tasks
[NASA-TT-F-14553] N72-32492
ROCKET ENGINE CASES
Fabrication procedures for filament-wound rocket motor case utilizing high-tensile strength graphite fibers
[NASA-CR-128417] N72-32766
ROCKET ENGINE DESIGN
Application of wirewound tungsten composites for design and fabrication of rocket components
[AD-743978] N72-32575
MPD arc thrustors operating in quasi-steady mode and using electrode vapor for propellant
[NASA-CR-112144] N72-32691
ROCKET ENGINES
Transpiration-cooled rocket chamber formed of porous metal wall
[NASA-CASE-LEW-11118-1] N72-32501
Rocket propulsion, liquid propellants, and thermonuclear propulsion systems
N72-32751
Development of theory of ramjet and rocket-ramjet engine operation - Vol. 2
[JPRS-57062-2-PT-2] N72-32758
ROCKET EXHAUST
Nonequilibrium flow and chemistry associated with rocket exhaust effluents in upper atmosphere
[AD-744081] N72-32633
ROCKET LAUNCHING
Meteorological and ballistics data for launch of Honest John rocket vehicle 141
[AD-743839] N72-32618
Meteorological and ballistics data for launch of Honest John missile launch 352
[AD-743840] N72-32619
Meteorological and ballistics data for launching of 11602 Lance missile 2131 round 156 EST
[AD-743844] N72-32623

ROCKS
Study of quaternary landforms and materials in mid-west and Great Plains using ERTS-1 imagery
[E72-10105] N72-32489
ROLLING MOMENTS
Effect of fin and rudder on rolling moments due to sideslip and yawing
[ESDU-70006] N72-31992
ROOMS
Terminal decontamination of rooms by gaseous formaldehyde
[NASA-TT-F-14544] N72-32087
ROOTS OF EQUATIONS
Generalization of regula falsi for approximate calculation of null points of system of nonlinear equations
[NASA-TT-F-14420] N72-32588
ROTARY WINGS
Wind tunnel tests to determine path of vortex moving from each rotor blade tip of helicopter rotor to establish effect on aerodynamic forces and pressure distribution
[NASA-TT-F-14462] N72-32012
ROTATION
Specimen holder with vertical oscillation and rotation for determining preferred orientation in metals by X ray diffraction
[ARL/MET-81] N72-32468
Charged particles with random equally probable phases of rotation about Larmor circle
[KHFTI-71-22] N72-32700
ROTOR BLADES
Painting schemes for improving rotating propeller and tail rotor visibility of military aircraft
[AD-744453] N72-32579
ROTORS
Analysis of operation conditions for gas turbine rotor bearings from results of computer calculations of their thermal regimes
[AD-744297] N72-32772
RUBIDIUM ISOTOPES
Rb-Sr isotopic study of 5 Bosumtwi, Ghana, crater glasses and 3 Ivory Coast tektites
[NASA-TT-F-14437] N72-32830
RUBY LASERS
Histopathology of argon, ruby, gallium arsenide, neodynium, and carbon dioxide laser induced retinal lesions
[AD-741380] N72-32127
Ruby laser test facility for conducting laser induced damage experiments with single subnanosecond pulses
[AD-744075] N72-32534
Measurement of ruby laser induced integral and beam emission from tungsten
[AD-744285] N72-32667
RUNNING
Effect of caffeine on athletic performance in 100 yard dash
[NASA-TT-F-14561] N72-32098
RUNWAYS
Numerical analysis of braking forces and frictional coefficients for aircraft tires on hard surface runways - Part 2
[ESDU-71026-PT-2] N72-32013
Measurement of three track runway and taxiway profiles for determining effect of surface conditions on airplane response to ground roughness
[NASA-TN-D-6932] N72-32045
Method for evaluation of operational and functional performance characteristics of landing mats
[AD-741857] N72-32278
Similitude requirements for application of scale model theory to design and evaluation of airfield pavements
[AD-741368] N72-32281

S

S MATRIX THEORY
Eigenvalues and eigenstates of S matrix in Lee model in V theta-N theta and V2 theta-N3 theta sectors
[TR-73-023] N72-32675
SACRAMENTO VALLEY [CA]
Structural and lithologic study of Northern Coast Range and Sacramento Valley, California using ERTS-1 imagery
[E72-10074] N72-32338
SAFETY
Application of ERTS-1 imagery to fracture related mine safety hazards in coal mining industry
[E72-10064] N72-32336
SAFETY FACTORS
Analysis of factors governing structural design of reusable space shuttle booster to select optimum structural factors of safety
[NASA-CR-123837] N72-32845
SAMPLING
Background compensated X ray radiometric logging in nuclear geophysical investigations
[NLL-RTS-6739] N72-32451
Curves for use with total heat and static pressure sampling methods for gross thrust, mass flow, and choking pressure ratio of air breathing engines in flight
[ESDU-69008] N72-32746
SANDS
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
SANDWICH STRUCTURES
Methods for solving problems on stressed state of isotropic sandwich plates and shells with rigid or light fillers
[AD-744177] N72-32931
SATELLITE OBSERVATION
Measurement of earth gravity by satellite observations and application of satellite data to various scientific fields
[NASA-TT-F-14546] N72-32399
Improved descriptions of geoid and geopotential using satellite altimeter data
[NASA-TM-X-66016] N72-32401
Global composition of stratosphere and mesosphere based on sounding rocket observations and satellite remote sensing techniques
[NASA-TM-X-66044] N72-32417
Development of computer programs for reducing data obtained from Radiation and Meteoroid Satellite mission
[NASA-CR-128535] N72-32833
SATELLITE ORBITS
Cartographic evaluation of ERTS-1 orbit and attitude data based on return beam vidicon data
[E72-10100] N72-32353
SATELLITE ORIENTATION
Cartographic evaluation of ERTS-1 orbit and attitude data based on return beam vidicon data
[E72-10100] N72-32353
SATELLITE TRACKING
Simulation study to determine 136 MHz and 400 MHz noise temperature of ground antennas for tracking RAE-B during data transmissions
[NASA-TM-X-66047] N72-32184
Tracking ATS 3 by very long baseline interferometer observations
[NASA-TM-X-66018] N72-32263
Formula for correcting tropospheric error in range-rate satellite tracking data
[NASA-TM-X-66017] N72-32812
Characteristics of Timation 3 circular polar orbit, and suitability of using laser ranging observations of Timation 3 for studies of earth geodynamics
[NASA-TM-X-66012] N72-32851
SATELLITE-BORNE PHOTOGRAPHY
Utilization of ERTS-1 photography for evaluation of Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352
SATURN [PLANET]
Design studies for X ray experiment using solid state detectors or proportional counter for exploring magnetospheres of Saturn and Jupiter and cosmic X ray sources
[NASA-CR-128250] N72-32455
Analysis of brightness data for planets Saturn and Uranus to determine occurrence of maximum and minimum brightness
[NASA-TT-F-14419] N72-32836
SAUDI ARABIA
Analysis of ERTS-1 multispectral data and imagery of northwest Saudi Arabia
[E72-10140] N72-32387
SCALE MODELS
Similitude requirements for application of scale model theory to design and evaluation of airfield pavements
[AD-741368] N72-32281
SCATTERING
Multiple scattering of tracks and statistical coupling influence, using chords and angle between neighboring tangents
[NASA-TT-F-14426] N72-32681
SCATTERING CROSS SECTIONS
Computing excitation cross sections for neutral atoms and positive ions by electron impact for lithium and sodium isoelectronic series
[NASA-TT-F-14430] N72-32680
Divergence of total cross section for three body rearrangement collisions with Coulomb interactions
[NASA-TM-X-66054] N72-32682
SCHEDULING
Effect of schedule control and sleep deprivation on human eye movement behavior
[AD-741397] N72-32134
SCIENCE
Federal funding to universities and colleges in FY 1971 according to contributing agency, university, and field of science
[NSF-72-316] N72-32962
SCINTILLATION
Amplitude and phase variance of optical signal propagating over folded laser path
[AD-743850] N72-32527
SCINTILLATION COUNTERS
Digital recording system for processing scintillation counter pulses in air shower experiment
[NASA-TT-F-14433] N72-32213
SEA WATER
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381
Estimation of sea surface temperature from Nimbus 4 measurements in 11-13 micron window region
[NASA-TM-X-66053] N72-32418
SEALS [STOPPERS]
Bibliographies on seal designs and applications
[AD-744050] N72-32504
SEAS
Analysis of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia
[E72-10101] N72-32354
SECONDARY INJECTION
Two dimensional turbine cascade with boundary layer injection, using existing incompressible boundary layer approximate solutions
[AD-744535] N72-32774
SEDIMENTS
Studies of inner shelf and coastal sedimentation environment of Beaufort Sea using ERTS-1 imagery
[E72-10062] N72-32335
Evaluation of suspended sediment plumes in Lake Ontario based on ERTS-1 imagery
[E72-10110] N72-32362
Numerical analysis to determine magnitude and kinetics of samples of suspensions from particle deposition and erosion
[WAPD-TM-1014] N72-32421
SEISMOGRAPHS
High gain seismograph stations and long period analog and digital data
[AD-744130] N72-32443
SEISMOLOGY
Development and characteristics of seismological station and data processing system in Norway
[AD-740845] N72-32447
SEMANTICS
Linguistic interactions and logic applied to models of cognition, education, and information retrieval
[AD-744009] N72-32144
Space programming language machine architecture study, including SPLM
[AD-743015] N72-32217
SEMICONDUCTING FILMS
Preparation and optical and electrical properties of vanadium oxide single crystals and films
[AD-744319] N72-32735
SEMICONDUCTOR DEVICES
Tolerance of transistors to voltage, current, power, and energy variations applied in reverse direction
[RAE-LIB-TRANS-1664] N72-32223
Telescope with two plane proportional counters and semiconductor detector for recording small energy protons on intense beta background
[JINR-P13-6261] N72-32477
Theta pinch in electron hole plasma of semiconductors with surface generation
[NP-19269] N72-32699
Single crystal semiconductors and devices and radiation sensitivity of amorphous semiconductors
[AD-743834] N72-32724
Effect of ionizing radiation on field effect transistors
[AD-744093] N72-32732
SEMICONDUCTORS [MATERIALS]
Target conductance and vidicon resolution, using electrical recording and/or illumination
[AD-740637] N72-32188
Single crystal semiconductors and devices and radiation sensitivity of amorphous semiconductors
[AD-743834] N72-32724
Infrared absorption spectra measurements of n-type silicon samples following irradiation to define zero-phonon lines and phonon-assisted sideband structure
[AD-743987] N72-32725
Analysis of reflection spectra of antimony and bismuth chalcogenides to show similarity of compound zone structure
[AD-744278] N72-32734
Electrical conductivity of glassy semiconductors to show effects of temperature, thermoelectricity, and photoelectricity
[AD-744249] N72-32736
Man-made superlattice in monocrystalline semiconductors
[AD-744524] N72-32740
SENSITIVITY
Sensitivity of radio telescope antennas and receivers
[NASA-TT-F-14441] N72-32469
Sensitivity of hot-wire anemothermometers used to analyze turbulence of supersonic flows
[NASA-TT-F-14458] N72-32475
SENSORS
Annealed foil fatigue sensor for full-scale C-5A aircraft
[AD-743968] N72-32058

SEPARATED FLOW
Flow control by cross jets
[NASA-TT-F-14548] N72-32303
SEQUENCING
BANDIT computer program as preprocessor to NASTRAN to automatically resequence grid point numbers for reduced matrix bandwidth
N72-32893
SERIES [MATHEMATICS]
Use of theta-operator and generalized hypergeometric functions in obtaining infinite series solutions of nth order linear ordinary differential equations
[NASA-TR-R-390] N72-32590
SERVICE LIFE
Surface hardening for increasing service life of steel bearings
[AD-744256] N72-32506
Load-life model for calculating fatigue life and reliability of helicopter spur gear mesh
[AD-744504] N72-32507
SEXTANTS
Design, development, characteristics, and evaluation of optical theodolites and range finders
[AD-744511] N72-32482
SHALLOW WATER
Refraction, shoaling, and friction of ocean waves reaching Port Phillip Heads, Australia
N72-32403
SHARP LEADING EDGES
Mathematical models for determining viscous interaction effects on sharp leading edges and blunt bodies during reentry at supersonic and hypersonic speeds
N72-32004
SHEAR FLOW
Mean fluid flow forces around finite-length cylinders in uniform and shear flow
[ESDU-70014-PT-2] N72-32291
SHEAR PROPERTIES
Thin walled, open beam theory and composite element including warping effects and offset shear centers
N72-32880
SHEAR STRAIN
Effects of lateral shear strain on rigidity of layered elastic and viscoelastic cylindrical shells
[AD-744252] N72-32928
SHELLS [STRUCTURAL FORMS]
Steady creep of shells of revolution using Tresk criterion
N72-32906
Stress analysis of arbitrary shells using finite element method with Lagrange multiplier for obtaining continuity of normal slopes of elementary boundaries
[TB-79] N72-32908
Development of equations for numerical analysis of strain in clamped spherical shells subjected to buckling forces
[AD-741198] N72-32917
Development of equations for determining thermoplasticity of thin shells under extreme temperature load and stressed and deformed state of shells
[AD-744140] N72-32922
SHIFT REGISTERS
Design and characteristics of ferrite diode shift register with capability for data regeneration or computation
[AD-744156] N72-32214
SHIPS
Compendium of US ground, water, and air transportation statistics
N72-32966
SHOCK LAYERS
Thin shock layer theory for determining flow pattern around conical wings
N72-31998
SHOCK TUBES
Facilities description of shock tube laboratory at Aachen, Germany
[AD-741191] N72-32269
Computer program for calculating expansion tube flow quantities for real gas mixtures including comparison of program results with experimental data
[NASA-TN-D-6830] N72-32300
SHOCK TUNNELS
Experimental analysis of wall boundary layer growth in 10 deg half angle conical nozzle of reflected shock tunnel
[NASA-TM-X-2647] N72-32317
SHOCK WAVES
Shock angle for sharp-nosed right circular cone in uniform supersonic flow
[ESDU-70008] N72-32290
Shock wave propagation in stellar atmospheric models
[NASA-TT-F-14438] N72-32315
Correlation of flow resistance and reflection coefficient for weak shock waves
[AD-744509] N72-32326
Measurement of shock waves and flux velocity of Jupiter solar wind during minimum activity
[NASA-TT-F-14470] N72-32821
Characteristics of sonic booms and damage caused to buildings due to supersonic overflights
[NTID300.12] N72-32913
SHORT TAKEOFF AIRCRAFT
Long range planning and analyses applied to social impact of short takeoff and landing operations in urban areas
[NASA-CR-128197] N72-32016
Analysis of factors affecting lateral-directional handling qualities of aircraft during short takeoff flight
N72-32033
Airfield distribution survey of Western European countries to determine effectiveness of STOL and VTOL aircraft
[AD-742096] N72-32279
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280
Optimization model for designing surface and air intercity passenger transport systems, and application to STOL link between Toronto and Montreal
[TR-72-1] N72-32972
SIDE-LOOKING RADAR
Iceberg classification using side-looking airborne radar
[AD-742653] N72-32425
SIDELOBES
Survey of techniques for supression of sidelobes in antenna array systems
[AD-743742] N72-32193
SIDESLIP
Effect of fin and rudder on rolling moments due to sideslip and yawing
[ESDU-70006] N72-31992
SIDEWINDER MISSILES
Formation of aluminum powder for propellant grains by rounding random shaped particles in fluid energy mill operating on inert gas
[AD-743484] N72-32744
SIGNAL DISTORTION
Distortion and low frequency signals in loudspeakers
[BBC-1972/25] N72-32170
SIGNAL PROCESSING
Underwater acoustic signal processing
[AD-744024] N72-32190
Coherent combining of angle-modulated signals using phase lock loops
[AD-744085] N72-32202
Techniques for implementing phase coded filters with surface wave delay lines
[AD-744474] N72-32253
Methods for reducing electrical noise interference in acoustic emission signal processing
[BNWL-1596] N72-32259
Digital processing of IR line-scan video signals collected during 24 hour period of aerial reconnaissance
[AD-744332] N72-32485
SIGNAL TRANSMISSION
Amplitude and phase variance of optical signal propagating over folded laser path
[AD-743850] N72-32527
SILICATES
Electron probe analysis of magnesium, aluminum, and silicon in silicate minerals using low accelerating potential
[NASA-TM-X-62185] N72-32570
SILICON
Infrared absorption spectra measurements of n-type silicon samples following irradiation to define zero-phonon lines and phonon-assisted sideband structure
[AD-743987] N72-32725
SILICON ALLOYS
Viscosity, density, and surface energy of molten alloys of iron and silicon
[AD-744255] N72-32566
SILICON CARBIDES
Nondestructive X ray topographic study of slip distribution in single alpha-SiC crystals
[AD-744076] N72-32730
SILICON COMPOUNDS
Growth of silicon thick films and application for fabrication of dies and orifices
[NASA-CR-128415] N72-32718
SILICON FILMS
Application of micro-Hall device for determining electrical properties of silicon crystals at low temperatures
[AD-744343] N72-32728
SIMILITUDE LAW
Similitude requirements for application of scale model theory to design and evaluation of airfield pavements
[AD-741368] N72-32281
SIMULATORS
Development and characteristics of core turbine for driving single and two stage fans in turbofan engine simulator
[NASA-TM-X-68130] N72-32762
SINGLE CRYSTALS
Magnetic properties of insulating and conducting EuTe single crystals at cryogenic temperature
[AD-742603] N72-32722
Analysis of superconducting and Fermi surface properties of single crystal thin films using tunneling techniques
[AD-743442] N72-32726
Nondestructive X ray topographic study of slip distribution in single alpha-SiC crystals
[AD-744076] N72-32730
Preparation and optical and electrical properties of vanadium oxide single crystals and films
[AD-744319] N72-32735
SINTERING
Development of alkaline battery electrodes using high temperature impregnation of sintered metal bases
[AD-744254] N72-32079
Influence of stoichiometric deviations on sintering mechanisms of defect CoO
[AD-744517] N72-32578
SKIN [ANATOMY]
Collagenase and collagen content of hairless mice skin during carcinogenesis
[NASA-TT-F-14579] N72-32105
SKYLAB PROGRAM
Skylab mission SL-3 mission requirements - Revision 6
[NASA-TM-X-68613] N72-32808
SLEEP
Effect of circadian variations in sleep-wake cycle on optical and acoustic stimuli reaction times
[RAE-LIB-TRANS-1668] N72-32093
Measurement of psychological stress caused by sonic booms during sleep as function of age
[FAA-AM-72-24] N72-32121
SLEEP DEPRIVATION
Effect of schedule control and sleep deprivation on human eye movement behavior
[AD-741397] N72-32134
SLIP FLOW
Slip flow in continuum physics and vorticity propagation past thin elliptical cylinders under perfect slip condition
[AD-743489] N72-32324
SNOW
Field trip study of intense snowstorms in Ishikari Plain, Japan, and similarities to intense snowstorms in Lake Erie and Lake Ontario areas
[PUBL-142] N72-32609
SNOW COVER
Mapping and detection of changes of snow cover on land and glaciers using ERTS-1 imagery
[E72-00103] N72-32356
Study of caribou movements and winter dispersal in Alaska in relation to prevailing snow cover using ERTS-1 imagery
[E72-10134] N72-32382
Survey of seasonal snow cover in Alaska based on ERTS-1 imagery
[E72-10136] N72-32384
SOCIOLOGY
Long range planning and analyses applied to social impact of short takeoff and landing operations in urban areas
[NASA-CR-128197] N72-32016
SODIUM
Free piston compressor for high pressure He, Na line broadening, and Fe I oscillator strength
[AD-744311] N72-32167
Computing excitation cross sections for neutral atoms and positive ions by electron impact for lithium and sodium isoelectronic series
[NASA-TT-F-14430] N72-32680
SOIL SCIENCE
Measurement of soil temperatures in Antarctic regions using liquid and resistance thermometers and comparison of results
[NASA-TT-F-14471] N72-32408
SOILS
Heat balance factors in agricultural soil
[NASA-TT-F-14511] N72-32393
Soil temperature, surface temperature, and climatic factors in mountain and plains regions
[NASA-TT-F-14323] N72-32398
Use and calibration of thermometers for soil temperature measurement and systematic error analysis using soil temperature versus depth curves and standard tautochrones
[NASA-TT-F-14479] N72-32407
SOLAR ACTIVITY
Geophysical phenomena in earth atmosphere and solar activity data - Oct. 1971
N72-32396
Solar physics and solar activity data
[AD-741783] N72-32790
SOLAR ACTIVITY EFFECTS
Measurement of shock waves and flux velocity of Jupiter solar wind during minimum activity
[NASA-TT-F-14470] N72-32821
SOLAR ARRAYS
Design, development, and evaluation of roll-up solar array rated at thirty watts per pound
[NASA-CR-128196] N72-32070
Integrated dynamic analysis simulation of space stations with controllable solar arrays
[NASA-CR-112145] N72-32849
SOLAR ATMOSPHERE
Two types of motion in solar atmosphere
[AD-740233] N72-32789
SOLAR AUXILIARY POWER UNITS
Design, development, and evaluation of roll-up solar array rated at thirty watts per pound
[NASA-CR-128196] N72-32070

SOLAR FLARES
Analytic solution to complete Fokker-Planck equation of solar particle events based on OGO-F data
[NASA-CR-128295] N72-32777
Energetic electrons from solar flares and associated type 3 radio bursts from metric to hectometric
[NASA-TM-X-66031] N72-32779
SOLAR GENERATORS
Design, development, and evaluation of roll-up solar array rated at thirty watts per pound
[NASA-CR-128196] N72-32070
SOLAR HEATING
Development of model of radioemission characteristics of planet Uranus
[NASA-TT-F-14454] N72-32831
SOLAR PHYSICS
Solar physics and solar activity data
[AD-741783] N72-32790
SOLAR RADIATION
Vertical incidence absorption in lower equatorial ionosphere during solar half-cycle
[NASA-TM-X-66029] N72-32778
Design and construction of grazing incidence telemetering monochromators for observing solar far ultraviolet and soft X ray radiation
[AD-743835] N72-32793
SOLAR RADIO BURSTS
Classification, distribution, and interpretation of peak flux density spectra of solar radio bursts
[AD-741750] N72-32791
SOLAR SPECTRA
Jungfraujoch and high altitude balloon observations of solar spectra and cold stars
[AD-744087] N72-32445
SOLAR TEMPERATURE
Solar mapping data acquisition, and brightness-temperature and polarization data
[AD-742235] N72-32792
SOLAR WIND
Rotating discontinuities in plasma with anisotropic pressure
[NASA-TT-F-14473] N72-32785
Forbush decreases and cosmic ray intensity variations due to azimuthal asymmetry in solar wind
[KFKI-71-79] N72-32788
Measurement of shock waves and flux velocity of Jupiter solar wind during minimum activity
[NASA-TT-F-14470] N72-32821
Mission analysis and spacecraft technical description of Explorer flight to study solar wind integration with Grigg-Skjellerup comet in 1977
[NASA-TM-X-66023] N72-32850
SOLENOIDS
Precision current regulator for superconducting solenoid
[JINR-P13-6231] N72-32234
SOLID PROPELLANTS
Reserach in developing polymeric binder for advanced solid propellant
[NASA-CR-128300] N72-32743
SOLID ROCKET PROPELLANTS
Formation of aluminum powder for propellant grains by rounding random shaped particles in fluid energy mill operating on inert gas
[AD-743484] N72-32744
Production methods used for producing hydrocarbon polymeric binder for solid rocket propellants
[NASA-CR-128414] N72-32767
SOLID SOLUTIONS
Linear differential equations describing connection between processes of deformation, thermal conductivity, and diffusion in solid isotropic two-phase solution
[NASA-TT-F-14572] N72-32948
SOLID STATE
Solid state RF amplifier design in frequency range 0.01 to 20 MHz
[CRC-1220] N72-32176
Solid state, plasma, and high energy research
[NP-19250] N72-32685
SOLID STATE DEVICES
Solid state amplifier for bridge circuit of atomic absorption mercury detector
[RI-7676] N72-32227
Two stage, solid state, microcircuit power amplifier in 2.25 GHz region of S band
[NASA-CR-130062] N72-32228
Design and evaluation of photoconductive-electroluminescent image intensifier screen
[AD-743956] N72-32243
Design studies for X ray experiment using solid state detectors or proportional counter for exploring magnetospheres of Saturn and Jupiter and cosmic X ray sources
[NASA-CR-128250] N72-32455
SOLID STATE LASERS
Computer controlled, dual parameter, pulse height analyzer for solid state laser emission
[AD-743459] N72-32530
SOLID STATE PHYSICS
Proceedings of conference on solid state physics, fracture mechanics, composite materials, liquid metals, and infrared optical materials - Vol. 1
[AD-744204] N72-32564
SOLIDIFIED GASES
Production of solid carbon dioxide particles in two-stage expansion from bottled gas and application to removal of tissue eschar in third degree burns
[AD-744338] N72-32737
SOLUBILITY
Inhibition mechanism of thermal discoloration of polyacrylonitrile by maleic imide supported by solubility studies
[RAE-LIB-TRANS-1593-[B]-PT-2] N72-32147
SOLUTIONS
Intraperitoneal administration of physiological solution as alternative method for hydrating human body
[NASA-TT-F-14574] N72-32103
SONIC BOOMS
Measurement of psychological stress caused by sonic booms during sleep as function of age
[FAA-AM-72-24] N72-32121
Characteristics of sonic booms and damage caused to buildings due to supersonic overflights
[NTID300.12] N72-32913
SOUND RANGING
Effects of increased gravity on bat echolocating mechanism
[JPRS-56073] N72-32084
SOUND TRANSMISSION
Methods for reducing electrical noise interference in acoustic emission signal processing
[BNWL-1596] N72-32259
SOUND WAVES
Surface deformation and acoustic wave scattering by spherical inclusion in isotropically elastic solid
[RE-440] N72-32655
Analysis of acoustic wave excitation in flame seeded with alkaline metal
[NASA-TT-F-14594] N72-32660
Bioacoustic criteria incorporating A-weighted sound levels in industry and government
[AD-744522] N72-32670
Characteristics of sonic booms and damage caused to buildings due to supersonic overflights
[NTID300.12] N72-32913
Vibration of thin flexible membrane at intermediate acoustic frequencies
[AD-743865] N72-32919
SOUNDING
Aerological ozone soundings at Hohenpeissenberg Meteorological Observatory from July through Dec. 1971
[AD-741882] N72-32612
SOUNDING ROCKETS
Global composition of stratosphere and mesosphere based on sounding rocket observations and satellite remote sensing techniques
[NASA-TM-X-66044] N72-32417
High altitude wind and temperature measurement data from meteorological sounding rockets, and radiosonde observations - Dec. 1970 N72-32603
SOUTH AMERICA
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280
SOUTH DAKOTA
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
SOUTHEAST ASIA
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280
SPACE CHARGE
Surged voltage drops over low density mercury arc in inductive current circuit, concentrated in space charge sheath
[TRITA-EPP-71-20] N72-32697
SPACE COMMUNICATION
Data management analysis of orbital operations study to include communications, rendezvous, stationkeeping, and detached element operations - Vol. 2 Pt. 3
[NASA-CR-115723] N72-32798
SPACE EXPLORATION
Congressional hearings on international agreement between USSR and US on peaceful use of space N72-32961
Report to House of Representatives on benefits accruing from space program
[H-REPT-92-1452] N72-32967
SPACE FLIGHT
Effect of space flight on changes in blood composition and body functions
[NASA-TT-F-14535] N72-32139
Soviet bloc research in astronomy, meteorology, oceanography, geology, and space science - 5 Sept. 1972
[JPRS-56944] N72-32815
Soviet bloc research in astronomy, meteorology, oceanography, geology, and space science - 14 Sept. 1972
[JPRS-57019] N72-32816
Method for obtaining hardware qualification for flight without using qualification tests
[NASA-CR-123831] N72-32843
SPACE MISSIONS
Orbital operations study to show interfacing activities, mission models, and potential interfacing element pairs - Vol. 1
[NASA-CR-128203] N72-32795
Interfacing activity analyses summary of orbital operations study - Vol. 2 Pt. 1
[NASA-CR-115721] N72-32796
Analysis of mating, orbital assembly, separation, payload deployment, and payload retraction for orbital operations study - Vol. 2 Pt. 2
[NASA-CR-115722] N72-32797
Data management analysis of orbital operations study to include communications, rendezvous, stationkeeping, and detached element operations - Vol. 2 Pt. 3
[NASA-CR-115723] N72-32798
Support operations activity analysis of orbital operations study to include crew transfer, cargo transfer, propellant transfer, and attached element operations - Vol. 2 Pt. 4
[NASA-CR-115724] N72-32799
Spacecraft and aerospace vehicle configurations for performance of space missions considered in orbital operations study - Vol. 3
[NASA-CR-115725] N72-32800
Analysis of orbital operations mission to verify existence of safe, feasible design concepts for mission accomplishment - Appendix A
[NASA-CR-115727] N72-32801
Operational procedures for each alternate approach for each interfacing activity of orbital operations study - Appendix B
[NASA-CR-128202] N72-32802
Bibliography of documents used during orbital operations study and description of space program elements - Appendix C
[NASA-CR-128201] N72-32803
Orbital operations study to include generic mission models, element pair interactions, and interfacing activities - Executive Summary
[NASA-CR-115726] N72-32804
SPACE NAVIGATION
Operational modes handbook for guidance system operations plan involving manned command module earth orbital missions using program SKYLARK 1 - Vol. 4
[NASA-CR-128544] N72-32641
SPACE PROGRAMS
COSPAR activities in space research N72-32959
Future conferences, international cooperative space programs, UN resolutions, and proposed standards of COSPAR N72-32960
SPACE RENDEZVOUS
Analysis of mating, orbital assembly, separation, payload deployment, and payload retraction for orbital operations study - Vol. 2 Pt. 2
[NASA-CR-115722] N72-32797
Support operations activity analysis of orbital operations study to include crew transfer, cargo transfer, propellant transfer, and attached element operations - Vol. 2 Pt. 4
[NASA-CR-115724] N72-32799
Operational procedures for each alternate approach for each interfacing activity of orbital operations study - Appendix B
[NASA-CR-128202] N72-32802
Planning intercept missions to comets
[NASA-TM-X-66026] N72-32810
SPACE SHUTTLE BOOSTERS
Analysis of factors governing structural design of reusable space shuttle booster to select optimum structural factors of safety
[NASA-CR-123837] N72-32845
SPACE SHUTTLES
Nonequilibrium real gas effects on lifting reentry aerothermodynamics of space shuttle vehicle N72-32003
Atmospheric propulsion, space shuttles, aeroelasticity, and aerodynamic heating N72-32753
Labor costs and techniques for refurbishment of thermal protection system for space shuttles - summary
[NASA-CR-112123] N72-32847
SPACE STATIONS
Defining space station options for experiment of 5 to 10 years
[NASA-CR-123759] N72-32842
Integrated dynamic analysis simulation of space stations with controllable solar arrays
[NASA-CR-112145] N72-32849

SPACE-TIME FUNCTIONS
Correlation coefficients for studying longitudinal velocity fluctuations at various distances from wall in circular duct
[NASA-TT-F-14463] N72-32314
SPACEBORNE PHOTOGRAPHY
Apollo experience report on photographic equipment and operations during manned space flight programs
[NASA-TN-D-6972] N72-32852
SPACECRAFT ANTENNAS
Furlable antenna for spacecraft
[NASA-CASE-NPO-11361] N72-32169
Radio Astronomy Explorer B satellite antenna aspect processor
[NASA-TM-X-66032] N72-32173
SPACECRAFT COMMUNICATION
Solid state RF amplifier design in frequency range 0.01 to 20 MHz
[CRC-1220] N72-32176
Approximation of effects of specular reflection multipath on TDR satellite to user link
[NASA-CR-122481] N72-32179
Mission planning, launch, communication, and testing of Intelsat 4 spacecraft
[NASA-TM-X-68626] N72-32818
SPACECRAFT COMPONENTS
Comparison of techniques for measuring ambient magnetic fields of spacecraft with single and dual magnetometers
[NASA-TM-X-66041] N72-32464
SPACECRAFT CONFIGURATIONS
Spacecraft and aerospace vehicle configurations for performance of space missions considered in orbital operations study - Vol. 3
[NASA-CR-115725] N72-32800
SPACECRAFT DESIGN
Aerodynamic problems of designing optimum hypersonic vehicles
[AGARD-LS-42-VOL-1] N72-31994
Procedures for designing hypersonic lifting vehicles N72-32002
Spacecraft and aerospace vehicle configurations for performance of space missions considered in orbital operations study - Vol. 3
[NASA-CR-115725] N72-32800
Analysis of orbital operations mission to verify existence of safe, feasible design concepts for mission accomplishment - Appendix A
[NASA-CR-115727] N72-32801
Design and construction of prototype vent system for exhausting gas to space from all liquid or two phase mixture of oxygen
[NASA-CR-123826] N72-32844
Analysis of factors governing structural design of reusable space shuttle booster to select optimum structural factors of safety
[NASA-CR-123837] N72-32845
Detailed examination of human engineering design standard MSFC-STD-267A for manned spacecraft design and recommendations for improvement of standard for future missions
[NASA-CR-61393] N72-32846
Research projects conducted by National Aerospace Laboratory of Netherlands during 1971 N72-32973
SPACECRAFT INSTRUMENTS
Design and development of thermal-mechanical pump for transmitting warming fluid through fluid circuit to control temperature of spacecraft instrumentation
[NASA-CASE-NPO-11417] N72-32498
SPACECRAFT LAUNCHING
Mission planning, launch, communication, and testing of Intelsat 4 spacecraft
[NASA-TM-X-68626] N72-32818
SPACECRAFT MODELS
Magnetic field model for estimating multi-polar magnetic fields associated with spacecraft in flight
[NASA-TM-X-66036] N72-32654
SPACECRAFT POWER SUPPLIES
Apollo experience report on design, testing, and development of lunar module electrical power subsystem
[NASA-TN-D-6977] N72-32848
SPACECRAFT STERILIZATION
Use of plasma cleaning and Auger spectroscopy to remove and monitor organic contamination on Viking spacecraft surfaces
[NASA-CR-128302] N72-32117
SPARK CHAMBERS
High voltage RF pulse supply for wide gap spark chamber
[EFI-ME-1[71]] N72-32684
SPECIFIC HEAT
Specific heat and equation of state of substance near critical point of heat and gas
[AD-744251] N72-32164
SPECIFIC IMPULSE
Flow model used to determine factors influencing effective specific impulse of external nuclear pulse propulsion systems
[NASA-TN-D-6984] N72-32764
SPECTRA
Spectrum of turbulence associated with magnetic pulsations of nonisothermal plasmas
[NP-19291] N72-32701
SPECTRAL BANDS
G-band measure and blue minus yellow color procedure for determining color excesses of B-V 115 F-K supergiants
[NASA-TM-X-66025] N72-32811
SPECTRAL RESOLUTION
Structural design and spectral characteristics of various infrared filters
[JPRS-56916] N72-32653
SPECTROGRAMS
Meteor spectrograms used to determine intensity distributions at various points of trajectory
[NASA-TT-F-14490] N72-32819
SPECTROPHOTOMETRY
Spectrophotometry of earth surface from Soyuz 7 and 9 spacecraft data N72-32466
SPECTROSCOPY
Use of plasma cleaning and Auger spectroscopy to remove and monitor organic contamination on Viking spacecraft surfaces
[NASA-CR-128302] N72-32117
Detection sensitivity of nonconductive powder samples in laser emission spectrography
[NASA-TT-F-14478] N72-32519
SPECTRUM ANALYSIS
Absorption band analysis of ERTS-1 data for discrimination of iron-rich zones
[E72-10111] N72-32363
Analysis of ERTS-1 multispectral data and imagery of northwest Saudi Arabia
[E72-10140] N72-32387
Light scattered at various angles by transparent media in general purpose, wideband optical spatial frequency, spectrum analyzer
[NASA-CR-128175] N72-32454
Origin and variations of steep electron spectrum and simple mathematical model for interplanetary cosmic rays
[NASA-CR-128282] N72-32776
SPECULAR REFLECTION
Range rate errors due to specular and diffuse multipath for TDR satellite
[NASA-CR-130054] N72-32177
Approximation of effects of specular reflection multipath on TDR satellite to user link
[NASA-CR-122481] N72-32179
SPHERICAL SHELLS
Methods for solving problems on stressed state of isotropic sandwich plates and shells with rigid or light fillers
[AD-744177] N72-32931
SPRAY NOZZLES
Effects of ambient air pressures on spray characteristics of swirl type injectors
[NLL-RTS-7250] N72-32287
STABILITY DERIVATIVES
Analysis of factors in stall and post stall operating conditions and effect on aircraft configurations N72-32029
Full scale wind tunnel tests to determine dynamic stability derivatives of variable-sweep fighter configuration with twin vertical tails
[NASA-TN-D-6909] N72-32044
Effects of variations in stability derivatives on performance of XV-4 aircraft
[AD-744104] N72-32066
STAINLESS STEELS
Influence of various thermomechanical treatments on creep behavior and time-to-rupture of stainless steel
[KFK-1512] N72-32552
STANDARDS
Future conferences, international cooperative space programs, UN resolutions, and proposed standards of COSPAR N72-32960
STATIC LOADS
Static and buckling analysis using NASTRAN and STARDYNE for graphite fiber reinforced plastic truss structure N72-32886
STATIC PRESSURE
Curves for use with total heat and static pressure sampling methods for gross thrust, mass flow, and choking pressure ratio of air breathing engines in flight
[ESDU-69008] N72-32746
STATIC TESTS
Coupling of NASTRAN with second finite element program for static analysis of automotive structures N72-32876
Static structural analysis of meridional tape forces, permeability, and change in model contours on aft half of inflatable decelerator device
[NASA-TN-D-6929] N72-32911
STATISTICAL ANALYSIS
Statistical model of atmospheric temperature fluctuations
[AD-743760] N72-32629
Propagation through turbulent atmospheres, nonlinear optics statistics, and cadmium telluride
[AD-744500] N72-32669
STATISTICAL WEATHER FORECASTING
Using quantitative radiance measurements from geosynchronous satellite for statistical weather forecasting
[AD-744098] N72-32635
STATISTICS
Utilization of ERTS-1 imagery as data sources for Kansas agricultural statistics
[E72-10127] N72-32375
Compendium of US ground, water, and air transportation statistics N72-32966
STATORS
Statoreactors for hypersonic aircraft, satellite launch vehicles, and missiles N72-32752
STEELS
Electrochemical measurement of corrosion rates of carbon steel, stainless steel, and Zircaloy 2 operating in high temperature environments
[STU-70-394/U-325] N72-32158
Analysis of hydrogen embrittlement of steel electrolytically plated by zinc cyanide process
[RAE-LIB-TRANS-1644-PT-2] N72-32496
Scuff resistant properties of steel materials used to finish spur and helical gears
[AD-742655] N72-32503
Surface hardening for increasing service life of steel bearings
[AD-744256] N72-32506
Results of ultrasonic inspection of wall thickness along length of forged steel pipe
[TR-7205.585] N72-32543
Ultrasonic inspection of weldments on steel cylinder
[TR-7206.588] N72-32544
Formation of nitrous austenite during diffusion saturation of 38 KhA steel
[AD-744151] N72-32560
Fatigue strength of steel screw threads not greater than 1.0 in diameter subjected to axial loading
[ESDU-69001] N72-32866
STELLAR ATMOSPHERES
Shock wave propagation in stellar atmospheric models
[NASA-TT-F-14438] N72-32315
STELLAR EVOLUTION
Carbon flash in degenerate region of star of five solar masses
[NASA-TT-F-14427] N72-32835
Stellar evolution and core contraction after central helium burning for star of 5 solar masses
[NASA-TT-F-14452] N72-32838
STELLAR GRAVITATION
Theoretical analysis of pulsar gravitation and starquakes to explain period breakdown of pulsars
[NASA-TT-F-14485] N72-32826
STELLAR LUMINOSITY
Weakening of stellar brightness observed through Burnham comet
[NASA-TT-F-14453] N72-32829
STELLAR MASS
Carbon flash in degenerate region of star of five solar masses
[NASA-TT-F-14427] N72-32835
STELLAR RADIATION
Theoretical analysis of pulsar gravitation and starquakes to explain period breakdown of pulsars
[NASA-TT-F-14485] N72-32826
Stellar image perturbation caused by earth atmospheric temperature heterogeneities and wind speeds, and stellar image jitter amplitude measurement
[AD-744172] N72-32841
STELLAR SPECTRA
Jungfraujoch and high altitude balloon observations of solar spectra and cold stars
[AD-744087] N72-32445
G-band measure and blue minus yellow color procedure for determining color excesses of B-V 115 F-K supergiants
[NASA-TM-X-66025] N72-32811
STERILIZATION
Death behavior of microorganisms during heat sterilization
[NASA-TT-F-14543] N72-32086
STOCHASTIC PROCESSES
Development of algorithm for solving problem of controlling time-varying linear avionic system with random parameters based on adaptive dual control strategy - Part 1
[AD-744115] N72-32064
STOICHIOMETRY
Influence of stoichiometric deviations on sintering mechanisms of defect CoO
[AD-744517] N72-32578
STOKES THEOREM [VECTOR CALCULUS]
Explicit expression for Mie phase matrix in 4-component Stokes vector representation for system containing polydispersion of spherical particles
[NASA-CR-128174] N72-32775

STORAGE BATTERIES
Bibiography of abstracts of articles on rechargable batteries for use in aerospace technology published between 1954 and 1970
[AECL-PAK/LIB-34] N72-32076
STORMS
Field trip study of intense snowstorms in Ishikari Plain, Japan, and similarities to intense snowstorms in Lake Erie and Lake Ontario areas
[PUBL-142] N72-32609
STORMS [METEOROLOGY]
Results of rapid measurement by cathode ray direction finder of electro-atmospheric discharges in storms
[NASA-TT-F-14417] N72-32411
STRAIN HARDENING
Incompressibility equation for determining high speed strain hardening of metal during pressure shaping from specimen test data
[AD-744185] N72-32514
STRAIN RATE
Analysis of effect of continuous and discontinuous changes in strain rate on relationship of strain rate, strain, and stress on Udimet alloys
[NASA-TN-D-6937] N72-32547
STRAITS
Relationships between wave height and period, and wind field characteristics in Bass Strait, Australia N72-32404
Wind and wave characteristics and relationships in Bass Strait, Australia, over 17-year period N72-32606
STRATOSPHERE
Method for collection of microscopic and submicroscopic particles in stratosphere during sounding balloon ascensions
[NASA-TT-F-14467] N72-32413
Global composition of stratosphere and mesosphere based on sounding rocket observations and satellite remote sensing techniques
[NASA-TM-X-66044] N72-32417
Meteorological synoptic analyses in stratosphere and lower mesosphere and F min values over North America
[AD-744470] N72-32437
STREAMS
Extraction of basin characteristics from ERTS-1 imagery for improving regression estimates of streamflow
[E72-10096] N72-32349
STRESS [PHYSIOLOGY]
Biomedical problems of space flight based on experiments in stress physiology and stress psychology
[JPRS-51660] N72-32107
Effect of flight stress on blood clotting in fighter pilots
[NASA-TT-F-14455] N72-32109
STRESS [PSYCHOLOGY]
Measurement of arrhythmia in relation to physical and mental work loads
[RAE-LIB-TRANS-1586] N72-32092
Biomedical problems of space flight based on experiments in stress physiology and stress psychology
[JPRS-51660] N72-32107
Effect of flight stress on blood clotting in fighter pilots
[NASA-TT-F-14455] N72-32109
Measurement of psychological stress caused by sonic booms during sleep as function of age
[FAA-AM-72-24] N72-32121
STRESS ANALYSIS
Subsonic wind tunnel tests to determine aerodynamic forces and pressure distribution on parachute canopy of ring-slot parachute model
[AD-744103] N72-32063
Geometrical analysis of displacements, angles of contact, stresses, and bending moments in radial ball bearing design
[NASA-TT-F-14556] N72-32497
Analysis of effect of continuous and discontinuous changes in strain rate on relationship of strain rate, strain, and stress on Udimet alloys
[NASA-TN-D-6937] N72-32547
Development of stress analysis method for three dimensional fiber composite structure and optimization routine for selecting minimum weight structure
[AD-744505] N72-32580
Computer program ASAAS for asymmetric stress analysis of axisymmetric solids and application to prediction of thermal stresses in reentry vehicle nosetip
[AD-743897] N72-32859
Method of estimating rms stress in stiffened skin panels subjected to random acoustic loading
[ESDU-72005] N72-32862
Static finite element stress analysis of inflated radial car tire N72-32883
High pressure turbine blade stress analysis using NASTRAN N72-32900
Stress analysis of arbitrary shells using finite element method with Lagrange multiplier for obtaining continuity of normal slopes of elementary boundaries
[TB-79] N72-32908
Bloch-Fourier analysis and computer code implementation for calculating micromechanical stress wave response of composite materials
[AD-743898] N72-32918
Analysis of lower critical load and character of corrugation formation in cylindrical shells subjected to torsion
[AD-744148] N72-32923
STRESS CONCENTRATION
Factors affecting data from photoelastic stress freezing for stress concentration near crack tips
[AD-742662] N72-32915
STRESS CORROSION
Proceeding of conference on effects of stress corrosion on cracking in stainless steel, corrosion in high strength alloys, and degradation of silicon nitride materials - Vol. 2
[AD-744205] N72-32565
STRESSES
Human endurance of impact overloads and mechanical stresses in human body
[NASA-TT-F-14571] N72-32102
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
STRINGERS
Local buckling coefficients for panels with single- or double-flanged stringers
[ESDU-71014] N72-32861
Flexural properties of lipped Z, or channel stringers
[ESDU-01.00.03] N72-32864
STRONTIUM ISOTOPES
Rb-Sr isotopic study of 5 Bosumtwi, Ghana, crater glasses and 3 Ivory Coast tektites
[NASA-TT-F-14437] N72-32830
STRUCTURAL ANALYSIS
Development of mathematical techniques for determining stresses, deformation, and stability of aerospace vehicle structures
[AD-744114] N72-32067
Conference presentations on design and structural analysis of graphite components
[CONF-701105] N72-32572
Application of NASTRAN to static and dynamic structural analysis
[NASA-TM-X-2637] N72-32867
NASTRAN user experiences and benefits N72-32869
General purpose applications computer programs, space technology impact, and NASTRAN N72-32870
NASTRAN buckling analysis for thin walled cylinder N72-32872
Buckling of isotropic and waffle-stiffened circular cylinders N72-32874
Structural analysis of isogrid structure of Delta launch vehicle N72-32877
Structural analysis of 40-story building, using NASTRAN N72-32895
Stress analysis of arbitrary shells using finite element method with Lagrange multiplier for obtaining continuity of normal slopes of elementary boundaries
[TB-79] N72-32908
Static structural analysis of meridional tape forces, permeability, and change in model contours on aft half of inflatable decelerator device
[NASA-TN-D-6929] N72-32911
Development of equations for numerical analysis of strain in clamped spherical shells subjected to buckling forces
[AD-741198] N72-32917
Development of procedures for predicting performance of materials in components and structures with application to decisions for specific designs
[AD-743991] N72-32920
Development of equations for determining thermoplasticity of thin shells under extreme temperature load and stressed and deformed state of shells
[AD-744140] N72-32922
Analysis of lower critical load and character of corrugation formation in cylindrical shells subjected to torsion
[AD-744148] N72-32923
STRUCTURAL DESIGN
Design, fabrication, and testing of four power slip rings for synchronous orbit application
[NASA-CR-130063] N72-32230
Design theory for large optical telescope
[NLL-RTS-7353] N72-32449
Structural design and spectral characteristics of various infrared filters
[JPRS-56916] N72-32653
NASTRAN applied to structural design analysis of airframe projects N72-32885
Optimization techniques for redesign and structural problems
[MATH-RES-9] N72-32903
Minimum weight elastic structure designs under dynamic loads
[NASA-TT-F-14540] N72-32904
STRUCTURAL DESIGN CRITERIA
Design problems of fluid flow around rectangular blocks
[ESDU-71016] N72-32288
Hailstone diameter distribution and design criteria
[AD-743831] N72-32624
STRUCTURAL ENGINEERING
Papers presented at conference on strength and plasticity
[AD-744495] N72-32927
STRUCTURAL PROPERTIES [GEOLOGY]
Structural and lithologic study of Northern Coast Range and Sacramento Valley, California using ERTS-1 imagery
[E72-10074] N72-32338
Evaluation of mineral resources based on ERTS-1 identification of continental crust geostructures
[E72-10095] N72-32348
Structure and mineral composition of meteor dust and meteorites
[NASA-TT-F-14472] N72-32825
STRUCTURAL VIBRATION
Vibrations of thin, closed, circular, cylindrical shell during sudden heating
[AD-744253] N72-32929
STRUTS
Bending of strut in one plane under combined action of end loads, side load, and end restraining moments
[ESDU-01.01.16] N72-32863
SUBLIMATION
Access to uncombined titanium sublayers in presence of inhibiting surface film in sublimation pumping of deuterium
[NASA-TM-X-68119] N72-32542
Sublimation ablation for hypersonic heat shielding device
[NASA-TT-F-14529] N72-32936
SUBROUTINES
FORTRAN subroutine for atmospheric density and appropriate corrections
[AD-744077] N72-32438
FORTRAN subroutine to NASTRAN for rigid structural dynamic problems N72-32881
SUBSONIC FLOW
Lift curve slope and aerodynamic center position of wings in inviscid supersonic and subsonic flow
[ESDU-70012] N72-31990
Calculating downwash angles behind wings with small span-chord ratios moving at subsonic speeds using nonlinear algebraic equations N72-32009
SUBSONIC SPEED
Development of procedures for calculating pressure distribution on airfoil in sonic stream
[ESDU-69013] N72-31989
SUBSONIC WIND TUNNELS
Subsonic wind tunnel tests to determine aerodynamic forces and pressure distribution on parachute canopy of ring-slot parachute model
[AD-744103] N72-32063
SUBSTRUCTURES
NASTRAN substructuring for square plate and static analysis of frame-wall interaction in multistory structures N72-32901
SUPERCONDUCTING MAGNETS
Theoretical and practical aspects of coil windings within superconducting magnets for proton synchrotron
[RPP/A-88] N72-32661
SUPERCONDUCTORS
Precision current regulator for superconducting solenoid
[JINR-P13-6231] N72-32234
Conductor procedure for fabricating twisted multifilament Nb3Sn superconductive ribbon
[NASA-TM-X-68124] N72-32715
Fabrication of stabilized Nb3Al superconductors with binary and ternary intermetallics
[NASA-TM-X-68126] N72-32716
Resistance states study of type-2 superconductors including extended linear range in volt-ampere characteristics
[JINR-P8-6260] N72-32720
Analysis of superconducting and Fermi surface properties of single crystal thin films using tunneling techniques
[AD-743442] N72-32726
SUPERGIANT STARS
G-band measure and blue minus yellow color procedure for determining color excesses of B-V 115 F-K supergiants
[NASA-TM-X-66025] N72-32811
SUPERHIGH FREQUENCIES
Automatic maximum power radiated from X band antenna for reentry vehicles
[AD-743994] N72-32244

SUPERSATURATION
Calculation of supersaturation and drop size distribution in stratiform clouds, and turbulent diffusion effects
[NLL-RTS-7058] N72-32599

SUPERSONIC AIRCRAFT
Comparison of flying quality criteria documents for United Kingdom and US aircraft to show areas of inadequacy in assessing acceptability of aircraft
N72-32019
Analysis of criteria for evaluation of high performance aircraft and results obtained on aircraft equipped with control augmentation systems
N72-32025
Effects of posture on decompression and hypoxic stress recovery induced by emergency descent of high altitude/multi-Mach transport aircraft
[AD-741686] N72-32131

SUPERSONIC COMMERCIAL AIR TRANSPORT
Development of criteria specification for supersonic transport aircraft and application to safe handling qualities for all regimes of flight operations
N72-32027

SUPERSONIC DIFFUSERS
Diagnostic techniques for determining fluid flow properties at nozzle exit and in lasing region of supersonic diffusion laser system
[AD-743999] N72-32531

SUPERSONIC FLOW
Lift curve slope and aerodynamic center position of wings in inviscid supersonic and subsonic flow
[ESDU-70012] N72-31990
Shock angle for sharp-nosed right circular cone in uniform supersonic flow
[ESDU-70008] N72-32290
Uniform supersonic flow of air past sharp-nosed, right circular cones
[ESDU-70010] N72-32293
Numerical solution to problem of supersonic flow around corner formed by two perpendicular plates
[NASA-TT-F-14537] N72-32301
Sensitivity of hot-wire anemothermometers used to analyze turbulence of supersonic flows
[NASA-TT-F-14458] N72-32475

SUPERSONIC SPEEDS
Development of procedures for calculating pressure distribution on airfoil in sonic stream
[ESDU-69013] N72-31989
Numerical approximation of wave drag characteristics of rectangular planform fairings at zero degree incidence in supersonic flow
[ESDU-71018] N72-32289
Analysis of three dimensional flow separations of supersonic streams flowing around solid cylindrical and circular jet obstructions above flat plate
[JPRS-56959] N72-32305

SUPPRESSORS
Low cost transient suppressor modules with Zener diode, fuse, and indicator lamp
[AD-743996] N72-32242

SURFACE DISTORTION
Measurement of surface displacement, surface vibration, and random surface movement using helium-neon laser holographic interferometry
[ARL/INST-76] N72-32517

SURFACE ENERGY
Viscosity, density, and surface energy of molten alloys of iron and silicon
[AD-744255] N72-32566

SURFACE FINISHING
Scuff resistant properties of steel materials used to finish spur and helical gears
[AD-742655] N72-32503
Surface hardening for increasing service life of steel bearings
[AD-744256] N72-32506
Chemical, mechanical, and physical properties of surface treated carbon fibers
[AD-743469] N72-32577

SURFACE PROPERTIES
Fluid flow forces acting on circular cylinders with smooth and rough surfaces
[ESDU-70013-PT-1] N72-32292
Extraction of textural features of selected frames of ERTS-1 imagery as basis for discrimination between types of categories of interest to ERTS investigators at Kansas
[E72-10124] N72-32453
Development of theory of infrared sensing system performance based on radiative properties of target and transmissive scattering effects
[NASA-CR-128416] N72-32472
Quality control of scatter plates for interferometric measurement of surface configurations of telescope mirrors and other optical components
[NASA-TM-X-64691] N72-32473
Scuff resistant properties of steel materials used to finish spur and helical gears
[AD-742655] N72-32503
Development of equations for describing conic pattern reradiated from crystalline surface for analysis of fault structure of crystalline material
[AD-744240] N72-32729

SURFACE ROUGHNESS EFFECTS
Measurement of three track runway and taxiway profiles for determining effect of surface conditions on airplane response to ground roughness
[NASA-TN-D-6932] N72-32045

SURFACE TEMPERATURE
Estimation of sea surface temperature from Nimbus 4 measurements in 11-13 micron window region
[NASA-TM-X-66053] N72-32418
Pyrometer for measuring surface temperature distribution on rotating turbine blade
[NASA-TM-X-68113] N72-32459

SURFACE VEHICLES
Optimization model for designing surface and air intercity passenger transport systems, and application to STOL link between Toronto and Montreal
[TR-72-1] N72-32972

SURFACE WAVES
Electron beam fabrication of surface wave transducers
[AD-744092] N72-32250
Techniques for implementing phase coded filters with surface wave delay lines
[AD-744474] N72-32253
Hydrodynamic equations for unstable internal waves in viscous fluid
[AD-744512] N72-32327

SURGES
Surged voltage drops over low density mercury arc in inductive current circuit, concentrated in space charge sheath
[TRITA-EPP-71-20] N72-32697

SURVEILLANCE
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334

SURVEYS
Survey of seasonal snow cover in Alaska based on ERTS-1 imagery
[E72-10136] N72-32384
Ground surveys and instrumentation for automation of measuring processes
[AD-743995] N72-32435

SUSPENDING [MIXING]
Evaluation of suspended sediment plumes in Lake Ontario based on ERTS-1 imagery
[E72-10110] N72-32362

SWEAT
Effect of direct application of K, Ca, Mg, and Ba ions on body temperature and sweat secretion
[NASA-TT-F-14545] N72-32095

SWEAT COOLING
Transpiration-cooled rocket chamber formed of porous metal wall
[NASA-CASE-LEW-11118-1] N72-32501

SWEPTBACK WINGS
Aerodynamic characteristics and performance of Russian M-4 supersonic long range aircraft
[AD-744159] N72-32051

SYNCHRONOUS SATELLITES
Design, fabrication, and testing of four power slip rings for synchronous orbit application
[NASA-CR-130063] N72-32230

SYNCHROTRON RADIATION
Model for calculation of synchrotron emission from high energy electrons in planetary Van Allen belts
[NASA-TM-X-66015] N72-32781

SYNCHROTRONS
Operational characteristics and performance measurements of fast-cycling pulsed, high voltage power supply for proton synchrotron
[CERN-72-5] N72-32235
Theoretical and practical aspects of coil windings within superconducting magnets for proton synchrotron
[RPP/A-88] N72-32661

SYNOPTIC METEOROLOGY
Summary of synoptic meteorological observations of Japanese coastal marine areas including Central East China Sea, Northern East China Sea, and Nagasaki
[AD-743488] N72-32614
Severe weather air mass analysis, and forecasting severe weather
[AD-744042] N72-32616
Developing computer derived map into terminal forecasting system
[AD-744102] N72-32638

SYSTEM EFFECTIVENESS
Effectiveness of ABK-3 device in obtaining reliable data during lateral coring exploration
[NLL-RTS-6743] N72-32256

SYSTEM FAILURES
Modification of onboard data management system software to multiprocessor fault tolerant system
[NASA-CR-128553] N72-32211

SYSTEMS ANALYSIS
Performance of ERTS-1 data collection system in total system context
[E72-10093] N72-32346
Development of theory of infrared sensing system performance based on radiative properties of target and transmissive scattering effects
[NASA-CR-128416] N72-32472
Analysis of closed loop conveyor system with single loading station, single unloading station, and operating with varying input and output flow rates
[AD-744529] N72-32508
Apollo experience report on photographic equipment and operations during manned space flight programs
[NASA-TN-D-6972] N72-32852
Systems analysis for decision makers
[P-4860] N72-32976
Effects of astronautics on science, technology, and production, and systems analysis of space-oriented human activity
[NASA-TT-F-14517] N72-32978

SYSTEMS ENGINEERING
Computer architectural language for designing machines to perform onboard computational functions
[AD-743014] N72-32216
Design and fabrication of binary addressable scan-conversion storage tube
[AD-742521] N72-32237
Digital filter design for FDM group demultiplexer single channel
[AD-744089] N72-32248
Design of high voltage pulse generator based on circuit for forming trapezoidal shaped pulses
[AD-744154] N72-32481
Bibliographies on seal designs and applications
[AD-744050] N72-32504
Conference presentations on design and structural analysis of graphite components
[CONF-701105] N72-32572

T

TABLES [DATA]
Aerological ozone soundings at Hohenpeissenberg Meteorological Observatory from July through Dec. 1971
[AD-741882] N72-32612
Meteorological and ballistics data for launching 03702 Honest John Missile Number 1624 Round 623 AML
[AD-743841] N72-32620
Meteorological data tables gathered for launching 12808 Lance missile number 2146 round 157 SPL
[AD-743843] N72-32622
Meteorological and ballistics data for launching of 11602 Lance missile 2131 round 156 EST
[AD-743844] N72-32623

TAKEOFF RUNS
Development of mathematical models for estimating takeoff distance over barriers between thirty and fifty feet high
[EG-5/1-AMEND-A] N72-32014
Properties of atmospheric turbulence at low altitudes and effect on aircraft during landing approach and takeoff
N72-32030
Analysis of factors affecting lateral-directional handling qualities of aircraft during short takeoff flight
N72-32033
Analysis of aircraft noise generation and optimization of flight paths to minimize effects of aircraft noise during takeoff
[NASA-TT-F-14468] N72-32042

TANTALUM
Experimental determination of dynamic properties of tantalum
[AD-741217] N72-32557

TANTALUM ALLOYS
Post-aging embrittlement of T-111 tantalum alloy exposed to high temperature environments
[NASA-TN-D-6988] N72-32549

TARGETS
Effects of differential target velocity, horizontal or vertical plane conditions, and air traffic controller experience on intersection time estimation accuracy of converging targets
[AD-745119] N72-32649

TASKS
Application of human-like teleoperator machine and robots to various industrial tasks
[NASA-TT-F-14553] N72-32492

TAXIING
Measurement of three track runway and taxiway profiles for determining effect of surface conditions on airplane response to ground roughness
[NASA-TN-D-6932] N72-32045

TAYLOR INSTABILITY
A priori bounds obtained for bifurcation problems in fluid dynamics including Taylor and Benard problems
[AD-744330] N72-32329

TDR SATELLITES
Range rate errors due to specular and diffuse multipath for TDR satellite
[NASA-CR-130054] N72-32177
Development and use of mathematical models of signals from TDR satellite
[NASA-CR-130055] N72-32178
Approximation of effects of specular reflection multipath on TDR satellite to user link
[NASA-CR-122481] N72-32179

Broadband FM scheme and modification for TDR satellite
[NASA-CR-130057] N72-32180
Range rate errors due to multipath reflection for TDR satellite
[NASA-CR-130056] N72-32181
TEACHING MACHINES
High costs of NASTRAN as teaching tool
N72-32894
TECHNICAL WRITING
Bibliography of documents used during orbital operations study and description of space program elements - Appendix C
[NASA-CR-128201] N72-32803
TECHNOLOGICAL FORECASTING
Long term scientific forecasting of trends in photogrammetry and geodesy
[AD-744347] N72-32444
TECHNOLOGY UTILIZATION
Exploiting unused NASA patents
[NASA-CR-128294] N72-32957
TECTONICS
Application of ERTS-1 imagery to geologic and tectonic mapping of Montana
[E72-10141] N72-32388
Models of underthrusting lithospheric plates for calculating displacement and deflection
[NASA-TM-X-66028] N72-32397
TEKTITES
Rb-Sr isotopic study of 5 Bosumtwi, Ghana, crater glasses and 3 Ivory Coast tektites
[NASA-TT-F-14437] N72-32830
TELEMETRY
Development of electronic modules and assemblies for processing telemetry data - Pt. 2
[RAE-LIB-TRANS-1645-PT-2] N72-32224
Telemetry and beacon antenna design for research rockets and satellites
[AD-744095] N72-32251
TELEOPERATORS
Application of human-like teleoperator machine and robots to various industrial tasks
[NASA-TT-F-14553] N72-32492
TELESCOPES
Design theory for large optical telescope
[NLL-RTS-7353] N72-32449
Borescope with adjustable hinged telescoping optical system
[NASA-CASE-MFS-15162] N72-32452
Quality control of scatter plates for interferometric measurement of surface configurations of telescope mirrors and other optical components
[NASA-TM-X-64691] N72-32473
Telescope with two plane proportional counters and semiconductor detector for recording small energy protons on intense beta background
[JINR-P13-6261] N72-32477
TELETYPEWRITER SYSTEMS
Cathode ray tube terminals for air traffic control teletypewriter systems
[AT-7330-OT] N72-32183
TELEVISION EQUIPMENT
Equipment designs for use in digital line store converters
[BBC-1972/28] N72-32171
TEMPERATURE CONTROL
Design and development of thermal-mechanical pump for transmitting warming fluid through fluid circuit to control temperature of spacecraft instrumentation
[NASA-CASE-NPO-11417] N72-32498
Analysis of thermodynamic properties of gas refrigerator with zero dead volume
N72-32942
TEMPERATURE DISTRIBUTION
Load capacity of wall enclosing electric arc
[NASA-TT-F-14367] N72-32693
Development of method for approximation temperature distribution in plane of symmetry downstream of jet injected normal to uniform cross-flow
[NASA-TN-D-6966] N72-32939
Numerical analysis for predicting three-dimensional flow patterns in shells of heat exchangers and temperature distributions
[EF/TN/A/48] N72-32944
TEMPERATURE EFFECTS
Thermal effects on clearance and stiffness of foil journal bearings for Brayton cycle turboalternator
[NASA-CR-2113] N72-32495
Relationship of temperature to evaporation in metal surfaces
N72-32540
Temperature dependences of viscosity of pure metals
[AD-744153] N72-32561
Buckling location and degradation factor due to temperature distribution for interstage of three stage missile
N72-32871
TEMPERATURE MEASUREMENT
Soil temperature, surface temperature, and climatic factors in mountain and plains regions
[NASA-TT-F-14323] N72-32398
Use and calibration of thermometers for soil temperature measurement and systematic error analysis using soil temperature versus depth curves and standard tautochrones
[NASA-TT-F-14479] N72-32407
Measurement of soil temperatures in Antarctic regions using liquid and resistance thermometers and comparison of results
[NASA-TT-F-14471] N72-32408
High altitude wind and temperature measurement data from meteorological sounding rockets, and radiosonde observations - Dec. 1970
N72-32603
TEMPERATURE MEASURING INSTRUMENTS
Geothermograph and meteorophytograph for automation of agrometeorological observations
[NASA-TT-F-14469] N72-32405
TEMPERATURE SENSORS
Adiabatic calorimeter for contact and radiation calibration of heat flux sensors
[AD-744178] N72-32486
TENSILE PROPERTIES
Analysis of effect of continuous and discontinuous changes in strain rate on relationship of strain rate, strain, and stress on Udimet alloys
[NASA-TN-D-6937] N72-32547
TENSILE STRENGTH
Fabrication procedures for filament-wound rocket motor case utilizing high-tensile strength graphite fibers
[NASA-CR-128417] N72-32766
TENSILE TESTS
Testing metals for tension, impact and variable loads
[JPRS-57075] N72-32912
TERMINAL FACILITIES
Design of automatic ground control system for controlling aircraft arriving in random fashion at terminal areas
[NASA-CR-128298] N72-32639
Development and evaluation of equipment and automation proposed for air traffic control systems for late 1970 and 1980 time period
[AD-743635] N72-32645
TERMINAL GUIDANCE
Technique to generate nondispersive, continuously variable microwave time delay for simulation of approach of radar to target
[AD-744242] N72-32286
TERNARY ALLOYS
Magnetization and Mossbauer experiments giving evidence of superparamagnetism in quenched face centered cubic [gamma] phase of ternary Fe-C-V alloy, Viscalloy 2
[NASA-TM-X-68127] N72-32652
TERRESTRIAL RADIATION
Hourly values of atmospheric radiation in equatorial regions from January to June 1972
[NASA-TM-X-66052] N72-32419
TEST EQUIPMENT
Application of micro-Hall device for determining electrical properties of silicon crystals at low temperatures
[AD-744343] N72-32728
TEST FACILITIES
Hydraulic research projects conducted at educational institute during fifty year period
[BULL.-44] N72-32265
Facilities description of shock tube laboratory at Aachen, Germany
[AD-741191] N72-32269
Ruby laser test facility for conducting laser induced damage experiments with single subnanosecond pulses
[AD-744075] N72-32534
TEST PILOTS
Development and application of pilot rating to determining performance and handling criteria of aircraft
N72-32028
TEXAS
Environmental impact statement on proposed construction of Hemphill Municipal Airport, Hemphill, Texas
[PB-206262-F] N72-32277
Monitoring changing geologic features along Texas Gulf Coast using ERTS-1 imagery
[E72-10097] N72-32350
TEXTURES
Extraction of textural features of selected frames of ERTS-1 imagery as basis for discrimination between types of categories of interest to ERTS investigators at Kansas
[E72-10124] N72-32453
THEMATIC MAPPING
Thematic mapping based on ERTS-1 return beam vidicon imagery
[E72-10094] N72-32347
THEODOLITES
Design, development, characteristics, and evaluation of optical theodolites and range finders
[AD-744511] N72-32482
THEOREM PROVING
Proof of impossibility theorem for group probability functions
[P-4862] N72-32589
THEORETICAL PHYSICS
Medium energy physics research, including engineering support, accelerator systems, and electronic instrumentation
[LA-4899] N72-32267
Alternate formulation of hadronic part of Glashow-Georgi theory of weak and electromagnetic interactions based on three triplet model
[TR-72-022] N72-32674
Eigenvalues and eigenstates of S matrix in Le. model in V theta-N theta and V2 theta-N3 theta sectors
[TR-73-023] N72-32675
THERMAL CONDUCTIVITY
Lattice thermal conductivity of deformed copper-germanium alloy after annealing
[AD-744127] N72-32738
Analysis of thermal conductivity and diffusivity near critical point of gases and binary liquids
[NASA-CR-2112] N72-32938
Linear differential equations describing connection between processes of deformation, thermal conductivity, and diffusion in solid isotropic two-phase solution
[NASA-TT-F-14572] N72-32948
THERMAL INSULATION
Flight recorder insulation and thermal protection for record tapes from crash fires
[FAA-NA-72-49] N72-32937
THERMAL PROTECTION
Labor costs and techniques for refurbishment of thermal protection system for space shuttles - summary
[NASA-CR-112123] N72-32847
THERMAL RADIATION
Cholesteric liquid crystals as indicators for qualitative and quantitative thermal analysis
[AD-744211] N72-32198
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334
Development of model of radioemission characteristics of planet Uranus
[NASA-TT-F-14454] N72-32831
THERMAL RESISTANCE
Development of heat resistant plastics and application to aerospace industry products
[AD-744190] N72-32583
THERMAL STABILITY
Effects of various pretreatments on microstructural stability of austenitic stainless steels from 550 to 750 C
[ORO-4044-2] N72-32556
Properties of two high temperature hydraulic fluids under shear and thermal stress conditions
[AD-744106] N72-32582
Development of heat resistant plastics and application to aerospace industry products
[AD-744190] N72-32583
Fabrication of stabilized Nb3Al superconductors with binary and ternary intermetallics
[NASA-TM-X-68126] N72-32716
THERMAL STRESSES
Computer program ASAAS for asymmetric stress analysis of axisymmetric solids and application to prediction of thermal stresses in reentry vehicle nosetip
[AD-743897] N72-32859
Structural dynamic and thermal stress analysis of nuclear reactor vessel support system, using NASTRAN and AXISOL
N72-32899
Development of equations for determining thermoplasticity of thin shells under extreme temperature load and stressed and deformed state of shells
[AD-744140] N72-32922
Thermal stresses in infinite, elastic, orthotropic cylinder under axisymmetric heating
[NASA-TT-F-14528] N72-32943
THERMIONIC DIODES
Design, fabrication, and testing of 5V ten-diode heat pipe thermionic module
[WASH-1199] N72-32952
THERMIONIC EMISSION
Measurement of ruby laser induced integral and beam emission from tungsten
[AD-744285] N72-32667
THERMOCOUPLES
Performance tests of aspirating thermocouple probes designed to measure gas temperature in two-phase gas-liquid system similar to that encountered in jet engine exhaust gas spray cooler
[AD-744513] N72-32484
THERMODYNAMIC PROPERTIES
Computer programs for calculation of thermodynamic properties of equilibrium air using either time-dependent or shock-capturing computational methods
[NASA-CR-2134] N72-32296
Development of mathematical model to determine interrelated structure of high altitude profiles based on thermodynamic properties
[NASA-CR-61398] N72-32415
Analysis of several air breathing jet engine systems using general thermodynamic approach based on physical-chemical conversions in gases and high temperatures - Vol. 1
[JPRS-57062-1-PT-1] N72-32757

Development of theory of ramjet and rocket-ramjet engine operation - Vol. 2
[JPRS-57062-2-PT-2] N72-32758
Development of equations for determining thermoplasticity of thin shells under extreme temperature load and stressed and deformed state of shells
[AD-744140] N72-32922
Design of active cooling scheme with discrete cooling passages and measurement of heat transfer distribution on convective cooled surface
[NASA-CR-112047] N72-32933
Analysis of thermodynamic properties of gas refrigerator with zero dead volume
N72-32942
Heat transfer characteristics of air jets impinging on concave side of right circular semicylinder
[NASA-TM-X-2657] N72-32950
Pseudothermodynamic model of system in thermodynamic disequilibrium
[INR-P-1367] N72-32951

THERMODYNAMICS
Kinetic model for describing thermodynamic and fluid dynamic processes in high temperature exhaust gas coolers
[AD-744514] N72-32769
Analysis of operation conditions for gas turbine rotor bearings from results of computer calculations of their thermal regimes
[AD-744297] N72-32772
Numerical thermomechanical model for welding and loading of fabricated structure
[AD-744212] N72-32930
Modulated beam mass spectrometer for studying vaporization/reflection reactions and thermodynamics of graphite material for use on reentry vehicle surfaces
[AD-744493] N72-32953

THERMOELASTICITY
Development of equations for determining thermoplasticity of thin shells under extreme temperature load and stressed and deformed state of shells
[AD-744140] N72-32922

THERMOMETERS
Use and calibration of thermometers for soil temperature measurement and systematic error analysis using soil temperature versus depth curves and standard tautochrones
[NASA-TT-F-14479] N72-32407

THERMONUCLEAR POWER GENERATION
Laser driven fusion pulses for generating commercial electric power in power plants
[LA-4858-VOL-1] N72-32521

THERMONUCLEAR REACTIONS
Production of plasmas by laser spark, and thermonuclear fusion
[NASA-TT-F-14465] N72-32518
Turbulence generated from source of free streaming energy in collisionless plasma
[AD-744230] N72-32709

THETA PINCH
Two dimensional MHD model for phases after first fast compression of theta pinch discharges
[IPP-1/124] N72-32698
Theta pinch in electron hole plasma of semiconductors with surface generation
[NP-19269] N72-32699

THICK FILMS
Growth of silicon thick films and application for fabrication of dies and orifices
[NASA-CR-128415] N72-32718

THICKNESS
Ultrasonic thickness measurement of iron panels for phenol cracking
[TR-7206.586] N72-32546

THIN FILMS
Access to uncombined titanium sublayers in presence of inhibiting surface film in sublimation pumping of deuterium
[NASA-TM-X-68119] N72-32542
Application of ellipsometry for determining characteristics of thin metal films used for electrical purposes
[AD-744065] N72-32723

THIN PLATES
Normal forces and center of pressure positions for thin flat plates
[ESDU-70015] N72-32295
Penetration of thin aluminum plate by quartz simulating micrometeoroid penetration and dense aluminum plasma expansion
[NASA-CR-123830] N72-32690
Uniaxial compressive buckling load for thin, flat, rectangular, orthotropic plates
[ESDU-71015] N72-32860

THIN WALLED SHELLS
NASTRAN buckling analysis for thin walled cylinder
N72-32872
Vibrations of thin, closed, circular, cylindrical shell during sudden heating
[AD-744253] N72-32929

THREADS
Fatigue strength of steel screw threads not greater than 1.0 in diameter subjected to axial loading
[ESDU-69001] N72-32866

THREE DIMENSIONAL FLOW
Analysis of three dimensional flow separations of supersonic streams flowing around solid cylindrical and circular jet obstructions above flat plate
[JPRS-56959] N72-32305
Three basic types of two dimensional calculations for approximating velocities in turbomachine blade flow
[NASA-TM-X-67959] N72-32759
Numerical analysis for predicting three-dimensional flow patterns in shells of heat exchangers and temperature distributions
[EF/TN/A/48] N72-32944

THRUST
Curves for use with total heat and static pressure sampling methods for gross thrust, mass flow, and choking pressure ratio of air breathing engines in flight
[ESDU-69008] N72-32746
Gross thrust and nozzle mass flow measurements for air breathing, ducted flow engines
[ESDU-69007] N72-32747
Intrinsic thrust and drag for air breathing ducted flow engines in flight
[ESDU-69006] N72-32748

THRUST BEARINGS
Geometrical analysis of displacements, angles of contact, stresses, and bending moments in radial ball bearing design
[NASA-TT-F-14556] N72-32497

THRUST MEASUREMENT
Methods for thrust determination in aircraft
[RAE-LIB-TRANS-1650] N72-32755

THRUST VECTOR CONTROL
Thruster development effort of biowaste resistojet program
[NASA-CR-112150] N72-32761

TIMBER INVENTORY
Utilization of ERTS-1 imagery for forest and rangeland inventories and detection of forest stress at Black Hills, Atlanta, and Manitou test sites
[E72-10070] N72-32337
Timber resource inventory of Washington State using ERTS-1 imagery
[E72-10116] N72-32367

TIRES
Static finite element stress analysis of inflated radial car tire
N72-32883

TISSUES [BIOLOGY]
Tissue equivalent human phantoms used to measure radiation dose rate of prototypic plutonium circulatory support heat sources
[BNWL-SA-4121] N72-32123

TITANIUM
Access to uncombined titanium sublayers in presence of inhibiting surface film in sublimation pumping of deuterium
[NASA-TM-X-68119] N72-32542
Domestic sources for titanium metal production
[NMAB-293] N72-32548

TITANIUM ALLOYS
Influence of different processing histories and microstructure on low temperature creep of Ti-Al-Sn
[SCL-RR-720227] N72-32554

TOPOLOGY
Classical expressions attributing infinite value to mean degree of polymerization
[NASA-TT-F-14486] N72-32153

TORSIONAL STRESS
Analysis of lower critical load and character of corrugation formation in cylindrical shells subjected to torsion
[AD-744148] N72-32923

TRACKING [POSITION]
Effect of isoniazid on psychomotor performance of aviator instructors
[AD-728823] N72-32120

TRADEOFFS
Tradeoff analysis in tactical digital to video converter
[AD-744086] N72-32218

TRAINING DEVICES
Design and evaluation of photoconductive-electroluminescent image intensifier screen
[AD-743956] N72-32243

TRAJECTORY ANALYSIS
Orbital operations study to show interfacing activities, mission models, and potential interfacing element pairs - Vol. 1
[NASA-CR-128203] N72-32795
Interfacing activity analyses summary of orbital operations study - Vol. 2 Pt. 1
[NASA-CR-115721] N72-32796

TRANSDUCERS
Electron beam fabrication of surface wave transducers
[AD-744092] N72-32250

TRANSISTORS
Tolerance of transistors to voltage, current, power, and energy variations applied in reverse direction
[RAE-LIB-TRANS-1664] N72-32223
Fast algorithm for determining bipolar transistor characteristics
[CEA-CONF-1944] N72-32233

TRANSMISSION LINES
Modular waveguide assembly consisting of orthogonally intersecting transmission lines coupled by two ferrite resonators
[JPRS-57102] N72-32186
Cable connector configurations for high voltage/current pulse transmission to exploding wire bridge
[NASA-CR-123815] N72-32221
Magnetic and electric coupling parameters between multiconductor transmission line and external electromagnetic field
[AD-743468] N72-32241

TRANSMISSION LOSS
Array method for reducing ground losses in high frequency antenna communication system
[AD-744469] N72-32247

TRANSONIC FLOW
Numerical computation of transonic flow around leading edge of wing profile
[NASA-TT-F-14285] N72-32010

TRANSONIC WIND TUNNELS
Wind tunnel wall corrections for two-dimensional flow applied to pressure distribution measurements in transonic wind tunnel
[NASA-TT-F-14316] N72-32264

TRANSPORT AIRCRAFT
Optimization methods for determining aerodynamic shapes of hypersonic transport vehicles
N72-31996
Analysis of gust loads on transport aircraft under various flight conditions
[ESDU-69023-AMEND-B] N72-32015
Analysis of design and functioning characteristics of flying control systems and effect on flight qualities of transport aircraft
N72-32032

TRANSPORT PROPERTIES
Transport phenomena, temporal correlation functions, and partition functions
[CEA-R-3597] N72-32593
Transport and radiation properties of plasmas
[AD-744518] N72-32714
Bibliography and summary on electronic structure and transport properties of amorphous semiconductors
[AD-744525] N72-32739

TRANSPORTATION
Transportation systems for military and civilian operations in northern Arctic regions
[AD-743990] N72-32284
Status of transportation and transportation policy in US
N72-32969
Interdisciplinary and multidisciplinary educational programs for intermodal transportation careers
N72-32980
National transportation policy and problem solving actions, and specific administration reports
[AR-1] N72-32985

TRAVELING WAVES
Coupled-mode equations for wave propagation in medium modulated by multiple-frequency traveling wave studied with many-space-scale perturbation theory
[AD-743861] N72-32664

TREES [PLANTS]
Tree ring analysis and radiocarbon dating for determining paleoclimatology
[AD-744129] N72-32634

TRIANGULATION
Accuracy of methods of redetermining geodetic grids with damaged points
[JPRS-56024] N72-32392

TRIGGER CIRCUITS
Energizing discharge lamps with trigger circuit for high intensity, incoherent light source
[NASA-CASE-XLE-2529-3] N72-32229

TROPICAL METEOROLOGY
Computerized simulation of tropical forest atmosphere
[AD-744482] N72-32613

TROPICAL STORMS
Methods of forecasting tropical cyclones and hurricanes
[AD-743763] N72-32628

TROPOSPHERE
Worldwide surface refractivity measurements at NASA spacecraft tracking sites for use in tropospheric modeling
[NASA-TN-D-6822] N72-32608
Formula for correcting tropospheric error in range-rate satellite tracking data
[NASA-TM-X-66017] N72-32812

TRUCKS
Compendium of US ground, water, and air transportation statistics
N72-32966

TRUSSES
Static and buckling analysis using NASTRAN and STARDYNE for graphite fiber reinforced plastic truss structure
N72-32886

TUNERS
Development and application of circular piezoelectric bender laser tuner to replace conventional laser tuners
[NASA-TM-X-66040] N72-32515
TUNGSTEN
Electron microprobe measurement of tungsten and molybdenum oxidation in oxygen atmospheres at low pressures and high temperature
[NASA-TT-F-14559] N72-32148
Mass spectroscopy measurements of desorption of oxygen from tungsten by means of electron impact
[NASA-TT-F-14481] N72-32156
Thermophysical properties of arc-cast tungsten and MOD 3 carbon to 2600 K
[AD-743976] N72-32559
Application of wirewound tungsten composites for design and fabrication of rocket components
[AD-743978] N72-32575
Measurement of ruby laser induced integral and beam emission from tungsten
[AD-744285] N72-32667
TUNNELING [EXCAVATION]
Effectiveness of ABK-3 device in obtaining reliable data during lateral coring exploration
[NLL-RTS-6743] N72-32256
TURBINE BLADES
Effect of droplet impacts on blades of wet steam turbines and resistance of materials to erosion based on number of load cycles and energy capacity of material before fracture
[RAE-LIB-TRANS-1654] N72-32307
Pyrometer for measuring surface temperature distribution on rotating turbine blade
[NASA-TM-X-68113] N72-32459
High strength alloy and processing procedure for cast air cooled blades used in gas turbines
[AD-744109] N72-32567
High pressure turbine blade stress analysis using NASTRAN
N72-32900
Analysis of heat transfer characteristics of three air cooled vanes in turbojet engine using impingement cooling, film cooling, and convection cooling
[NASA-TM-X-2580] N72-32949
TURBINE ENGINES
Development and characteristics of core turbine for driving single and two stage fans in turbofan engine simulator
[NASA-TM-X-68130] N72-32762
TURBOCOMPRESSORS
Computer programs for analyzing axial compressor aerodynamic test data
[AD-744503] N72-32756
TURBOFAN ENGINES
Design and operation of first-stage and two-stage of small, low cost turbofan engine to determine specific work, torque, mass flow, and efficiency
[NASA-TN-D-6967] N72-32072
Development and characteristics of core turbine for driving single and two stage fans in turbofan engine simulator
[NASA-TM-X-68130] N72-32762
TURBOGENERATORS
Thermal effects on clearance and stiffness of foil journal bearings for Brayton cycle turboalternator
[NASA-CR-2113] N72-32495
TURBOJET ENGINES
Design and development of ground to air self-rescue aircraft with vertical takeoff capability and seventy-five nautical mile cruise range
[AD-743477] N72-32059
Modular multichannel data processing system for turbojet engine testing
[NASA-TM-X-68123] N72-32458
Analysis of several air breathing jet engine systems using general thermodynamic approach based on physical-chemical conversions in gases and high temperatures - Vol. 1
[JPRS-57062-1-PT-1] N72-32757
Analysis of particulate emissions contained in afterburning turbojet engine exhaust operating at ground level - Part 1
[AD-744048] N72-32768
Kinetic model for describing thermodynamic and fluid dynamic processes in high temperature exhaust gas coolers
[AD-744514] N72-32769
Theory, design, and operating principles of aircraft turbomachines
[AD-744183] N72-32773
Analysis of heat transfer characteristics of three air cooled vanes in turbojet engine using impingement cooling, film cooling, and convection cooling
[NASA-TM-X-2580] N72-32949
TURBOMACHINE BLADES
Three basic types of two dimensional calculations for approximating velocities in turbomachine blade flow
[NASA-TM-X-67959] N72-32759
TURBOMACHINERY
Total pressure averaging in pulsating flows of turbomachine type
[NASA-TM-X-68128] N72-32316
Theory, design, and operating principles of aircraft turbomachines
[AD-744183] N72-32773
TURBULENCE
Turbulence generated from source of free streaming energy in collisionless plasma
[AD-744230] N72-32709
TURBULENCE EFFECTS
Measurement of human operator performance in single axis tracking task during simulated turbulent conditions
N72-32034
TURBULENCE METERS
Sensitivity of hot-wire anemothermometers used to analyze turbulence of supersonic flows
[NASA-TT-F-14458] N72-32475
TURBULENT BOUNDARY LAYER
Development of mathematical models for determining mean velocity distribution of two dimensional turbulent boundary layers
[ARL/ME-134] N72-32311
Experimental analysis of wall boundary layer growth in 10 deg half angle conical nozzle of reflected shock tunnel
[NASA-TM-X-2647] N72-32317
Two dimensional turbine cascade with boundary layer injection, using existing incompressible boundary layer approximate solutions
[AD-744535] N72-32774
TURBULENT DIFFUSION
Calculation of supersaturation and drop size distribution in stratiform clouds, and turbulent diffusion effects
[NLL-RTS-7058] N72-32599
Asymptotic size distribution of large drops in stratiform clouds, and turbulent diffusion effects on distribution
[NLL-RTS-7060] N72-32601
TURBULENT FLOW
Wind tunnel tests to determine path of vortex moving from each rotor blade tip of helicopter rotor to establish effect on aerodynamic forces and pressure distribution
[NASA-TT-F-14462] N72-32012
Reduction of turbulent friction by use of elastic coatings
[NASA-TT-F-14601] N72-32304
Aerodynamics of swirling flow in annular channel with determination of convective heat transfer
[AD-744157] N72-32321
Conic, square-edged orifice for turbulent flow in shipboard automatic control systems
[AD-743479] N72-32323
TWO DIMENSIONAL FLOW
Wind tunnel wall corrections for two-dimensional flow applied to pressure distribution measurements in transonic wind tunnel
[NASA-TT-F-14316] N72-32264
Two dimensional motion of incompressible fluid bounded by flexible film
[NASA-TT-F-14575] N72-32312
Three basic types of two dimensional calculations for approximating velocities in turbomachine blade flow
[NASA-TM-X-67959] N72-32759
TYPE 3 BURSTS
Energetic electrons from solar flares and associated type 3 radio bursts from metric to hectometric
[NASA-TM-X-66031] N72-32779

U

U.S.S.R.
Aerodynamic characteristics and performance of Russian M-4 supersonic long range aircraft
[AD-744159] N72-32051
Congressional hearings on international agreement between USSR and US on peaceful use of space
N72-32961
UBV SPECTRA
G-band measure and blue minus yellow color procedure for determining color excesses of B-V 115 F-K supergiants
[NASA-TM-X-66025] N72-32811
UDIMET ALLOYS
Analysis of effect of continuous and discontinuous changes in strain rate on relationship of strain rate, strain, and stress on Udimet alloys
[NASA-TN-D-6937] N72-32547
ULTRASONIC RADIATION
Development of equations for describing conic pattern reradiated from crystalline surface for analysis of fault structure of crystalline material
[AD-744240] N72-32729
ULTRASONIC TESTS
Ultrasonic inspection of weldment in high pressure, high temperature tube
[TR-7205.584] N72-32494
Results of ultrasonic inspection of wall thickness along length of forged steel pipe
[TR-7205.585] N72-32543
Ultrasonic inspection of weldments on steel cylinder
[TR-7206.588] N72-32544
Ultrasonic inspection of weldments in cast iron cylinder
[TR-7206.587] N72-32545
Ultrasonic thickness measurement of iron panels for phenol cracking
[TR-7206.586] N72-32546
ULTRAVIOLET RADIATION
Design of instrument based on Ulbrichts sphere for measuring UV radiation incident at arbitary angles
[NASA-TT-F-14416] N72-32470
Instrument with spherical attachment for measuring UV radiation at large incident angles
[NASA-TT-F-14418] N72-32471
Calibrating photosensitive devices in ultraviolet range of 1022 to 2500 A
[NASA-TN-D-6991] N72-32474
Electron spin resonance analysis of yttrium oxides, cerium oxides, and thorium dioxide to determine parametric point defects in single crystals
[AD-744516] N72-32733
Design and construction of grazing incidence telemetering monochromators for observing solar far ultraviolet and soft X ray radiation
[AD-743835] N72-32793
ULTRAVIOLET SPECTRA
Optical and riometer data from 6 to 10 March 1970 geophysical event
[AD-744074] N72-32439
UNDERGROUND COMMUNICATION
Boundary value solution for plane wave reflection from underground grid of thin insulated wires
[AD-744079] N72-32261
Measuring minimum electrical conductivity in earth crust, for long-range communication through low-conductivity region
[AD-743867] N72-32432
UNDERGROUND EXPLOSIONS
High gain seismograph stations and long period analog and digital data
[AD-744130] N72-32443
Development and characteristics of seismological station and data processing system in Norway
[AD-740845] N72-32447
UNDERWATER ACOUSTICS
Underwater acoustic signal processing
[AD-744024] N72-32190
Expansion technique for rendering WKBJ wave equation method uniformly valid in underwater acoustics
[AD-742465] N72-32662
UNDERWATER VEHICLES
Optimum hydrodynamic configurations for submerged minimum drag axisymmetric vehicles in incompressible fluids
[AD-744314] N72-32330
UNIFORM FLOW
Mean fluid flow forces around finite-length cylinders in uniform and shear flow
[ESDU-70014-PT-2] N72-32291
Uniform supersonic flow of air past sharp-nosed, right circular cones
[ESDU-70010] N72-32293
UNIQUENESS THEOREM
Application of uniqueness theorems for singular solutions to boundary-initial value problems in linear elastodynamics
[AD-744346] N72-32926
UNITED STATES OF AMERICA
Photomapping of US using ERTS-1 return beam vidicon imagery
[E72-10108] N72-32360
Congressional hearings on international agreement between USSR and US on peaceful use of space
N72-32961
Status of transportation and transportation policy in US
N72-32969
UNIVERSITIES
Federal funding to universities and colleges in FY 1971 according to contributing agency, university, and field of science
[NSF-72-316] N72-32962
UNSTEADY FLOW
Total pressure averaging in pulsating flows of turbomachine type
[NASA-TM-X-68128] N72-32316
UPPER ATMOSPHERE
Neutral density data from OGO-F and geomagnetic storms
[NASA-CR-122479] N72-32390
Development of mathematical model to determine interrelated structure of high altitude profiles based on thermodynamic properties
[NASA-CR-61398] N72-32415
Boltzmann kinetic equations applied to analysis of upper atmospheric properties
[NASA-TT-F-14434] N72-32416
Annotated bibliography on upper atmosphere phenomena in polar regions
[AD-743952] N72-32424

Past and current research on upper atmosphere over polar regions - bibliography
[AD-744090] N72-32440
Meteorological data tables gathered for launching 12808 Lance missile number 2146 round 157 SPL
[AD-743843] N72-32622
Nonequilibrium flow and chemistry associated with rocket exhaust effluents in upper atmosphere
[AD-744081] N72-32633
Atmosphere Explorer C and D measurements of energy input into upper atmosphere due to electrons and protons in energy range 0.2 to 25 keV
[NASA-TM-X-66051] N72-32683

URANUS [PLANET]
Development of model of radioemission characteristics of planet Uranus
[NASA-TT-F-14454] N72-32831
Analysis of brightness data for planets Saturn and Uranus to determine occurrence of maximum and minimum brightness
[NASA-TT-F-14419] N72-32836

URBAN PLANNING
Optimization model for designing surface and air intercity passenger transport systems, and application to STOL link between Toronto and Montreal
[TR-72-1] N72-32972

URBAN TRANSPORTATION
Analysis of accomplishments in public transportation developments and predictions of future requirements
N72-32982

UTAH
Environmental impact statement on proposed improvements to Manti-Ephraim Airport, Ephraim, Utah
[PB-207064-F] N72-32270

V

V/STOL AIRCRAFT
Proceedings of conference on handling qualities and performance criteria for conventional and V/STOL aircraft
[AGARD-CP-106] N72-32017
Revisions to handling qualities criteria for V/STOL aircraft with emphasis on instrument flight characteristics
N72-32021
Development of V/STOL aircraft handling qualities criteria specification and analysis of deficiencies
N72-32022

VACANCIES [CRYSTAL DEFECTS]
Segregation of impurities to grain boundaries generated by vacancy currents in metals
[AD-744519] N72-32562

VALIDITY
Influence of programming language design on program validation
[P-4865] N72-32210

VANADIUM OXIDES
Preparation and optical and electrical properties of vanadium oxide single crystals and films
[AD-744319] N72-32735

VAPOR DEPOSITION
Means of vapor deposition using electric current and evaporator filament
[NASA-CASE-LAR-10541-1] N72-32487

VAPOR PHASES
Terminal decontamination of rooms by gaseous formaldehyde
[NASA-TT-F-14544] N72-32087

VAPORIZING
Mass spectrometric search for polymers in carbon vapors and analysis of graphite vaporization kinetics
[AD-744494] N72-32165
Modulated beam mass spectrometer for studying vaporization/reflection reactions and thermodynamics of graphite material for use on reentry vehicle surfaces
[AD-744493] N72-32953

VEGETATION
Identification of coastal vegetation species in Delaware using ERTS-1 imagery
[E72-10120] N72-32370
Identification of phenological stages and vegetative types for land use classification in Alaska using ERTS-1 imagery
[E72-10138] N72-32386
Identification of Delaware coastal vegetation species in ERTS-1 imagery
[E72-10142] N72-32389

VEHICULAR TRACKS
Test track with nine separate rail support structures on Atchison, Topeka, and Santa Fe Railway
N72-32875

VELOCITY DISTRIBUTION
Development of mathematical models for determining mean velocity distribution of two dimensional turbulent boundary layers
[ARL/ME-134] N72-32311

VENUS ATMOSPHERE
Propagation of radio waves through lower atmosphere of Venus and simplified model providing atmospheric attenuation factors
[NASA-TM-X-66046] N72-32185

VERTEBRAE
Mechanical compression strength of vertebrae and intervertebral disks in humans
[NASA-TT-F-14566] N72-32101

VERTICAL TAKEOFF AIRCRAFT
Airfield distribution survey of Western European countries to determine effectiveness of STOL and VTOL aircraft
[AD-742096] N72-32279
Airfield distribution survey of selected countries in Southeast Asia, South America, Africa, and Eastern Europe to determine effectiveness of STOL and VTOL aircraft
[AD-742093] N72-32280

VERTIGO
Investigation of military aircraft accidents involving vertigo and orientation errors
[AD-743483] N72-32061

VESTIBULAR TESTS
Role of higher sections of central nervous system in motion sickness
[AD-742409] N72-32133

VHF OMNIRANGE NAVIGATION
Low altitude flight test to determine accuracy of VOR Tacan air navigation aid
N72-32642
Electromagnetic measurements of Doppler VOR navigation system in Washington, D.C. area
[TN-6050.23-ADD] N72-32643

VIBRATION
Effect of noise and vibration on hearing and worker ear structures
[NASA-TT-F-14542] N72-32094
Vibration of thin flexible membrane at intermediate acoustic frequencies
[AD-743865] N72-32919

VIBRATION EFFECTS
Effect of continuous noise and vibration on carbohydrate, fat, and protein metabolism in white rats
[NASA-TT-F-14569] N72-32090
Effect of vibration on relationship of bioelectric activity and oxygen demand in cerebrum of rats
[NASA-TT-F-14570] N72-32091

VIBRATION MEASUREMENT
Measurement and phase analysis of vibrations in reciprocating compressors
[TR-7205.582] N72-32456
Development of methods for directly integrating governing equations of motion of dynamic structural analysis
[AD-743984] N72-32914

VIBRATION MODE
NASTRAN finite element representation to predict vibration modes of panels
N72-32878
Aeroelastic analysis and vibration modes for flutter and flight control system definition
N72-32882

VIBRATIONAL SPECTRA
Vibrational energy distribution of nitrogen molecules in electronic ground state
[AD-743567] N72-32528

VIDICONS
Target conductance and vidicon resolution, using electrical recording and/or illumination
[AD-740637] N72-32188

VIKING LANDER SPACECRAFT
Wind tunnel flow field measurements around Mars lander model using hot-film anemometers under simulated Mars surface conditions
[NASA-TN-D-6820] N72-32853

VIKING MARS PROGRAM
Use of plasma cleaning and Auger spectroscopy to remove and monitor organic contamination on Viking spacecraft surfaces
[NASA-CR-128302] N72-32117

VISCOELASTICITY
Axisymmetric die in contact with viscoelastic half space and noncommutative operators
[NRC-TT-1572] N72-32909

VISCOSITY
Temperature dependences of viscosity of pure metals
[AD-744153] N72-32561
Viscosity properties based on X ray diffraction data for iron carbon melts with nickel and tungsten additives
[AD-744263] N72-32563
Viscosity, density, and surface energy of molten alloys of iron and silicon
[AD-744255] N72-32566
Properties of two high temperature hydraulic fluids under shear and thermal stress conditions
[AD-744106] N72-32582

VISCOUS FLOW
Mathematical models for determining viscous interaction effects on sharp leading edges and blunt bodies during reentry at supersonic and hypersonic speeds
N72-32004

VISCOUS FLUIDS
Hydrodynamic equations for unstable internal waves in viscous fluid
[AD-744512] N72-32327

VISIBILITY
Painting schemes for improving rotating propeller and tail rotor visibility of military aircraft
[AD-744453] N72-32579

VISION
Psychological verification of digitally simulated models of human visual system
[AD-742431] N72-32132

VISUAL PERCEPTION
Effect of schedule control and sleep deprivation on human eye movement behavior
[AD-741397] N72-32134

VJ-101 AIRCRAFT
Analysis of aerodynamic characteristics of VJ-101C and DO 31E V/STOL aircraft and comparison with criteria contained in handling requirements documents
N72-32024

VOLCANOES
Thermal surveillance of volcanoes in Cascade Range and Iceland using ERTS-1 remotely sensed data
[E72-10061] N72-32334

VOLCANOLOGY
Glaciology and volcanology studies of Wrangell Mountains, Alaska
[E72-10129] N72-32377

VOLT-AMPERE CHARACTERISTICS
Resistance states study of type-2 superconductors including extended linear range in volt-ampere characteristics
[JINR-P8-6260] N72-32720

VORTICES
Nonlinear theory of lifting surfaces applied to problem of forces acting on rectangular wing in stream of incompressible fluid
N72-32008
Wind tunnel tests to determine path of vortex moving from each rotor blade tip of helicopter rotor to establish effect on aerodynamic forces and pressure distribution
[NASA-TT-F-14462] N72-32012

VORTICITY
Slip flow in continuum physics and vorticity propagation past thin elliptical cylinders under perfect slip condition
[AD-743489] N72-32324

W

WABASH RIVER BASIN [IL-IN-OH]
Automatic identification of forest and agriculture cover types utilizing ERTS-1 data of Wabash River Basin
[E72-10118] N72-32368

WAKEFULNESS
Effect of circadian variations in sleep-wake cycle on optical and acoustic stimuli reaction times
[RAE-LIB-TRANS-1668] N72-32093

WALKING MACHINES
Development of multilevel algorithm for controlling movement of six-legged automatic walking apparatus
[JPRS-57018] N72-32499

WARNING
Weather warning advisories and typhoon/hurricane warning procedures
[AD-741827] N72-32617

WARPAGE
Thin walled, open beam theory and composite element including warping effects and offset shear centers
N72-32880

WASHINGTON
Timber resource inventory of Washington State using ERTS-1 imagery
[E72-10116] N72-32367

WASTE DISPOSAL
Thruster development effort of biowaste resistojet program
[NASA-CR-112150] N72-32761

WATER
Evaluation of effect of water stress, disease and leaf area on reflectance characteristics, production, and prediction of disease severity and economic loss of wheat using ERTS-1 imagery
[E72-10126] N72-32374
Model of character and growth of stratiform cloud containing water in gas, liquid, and ice phases and of purely crystalline cloud
[NLL-RTS-7061] N72-32602
Quantitative spectra of atmospheric ice and absorptivity coefficients for ice and liquid water
[AD-743445] N72-32631

WATER CURRENTS
ERTS-1 imagery of water currents and circulation in Prince William Sound
[E72-10132] N72-32380

WATER FLOW
Development of techniques for visualization of water flow in water tunnel installation
[ARL/A-NOTE-335] N72-32309
Extraction of basin characteristics from ERTS-1 imagery for improving regression estimates of streamflow
[E72-10096] N72-32349

ERTS-1 imagery of water currents and circulation in Prince William Sound
[E72-10132] N72-32380
Sea, ice, and surface water circulation along Alaskan continental shelf analyzed using ERTS-1 imagery
[E72-10133] N72-32381

WATER MANAGEMENT
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359

WATER RESOURCES
Provision of near real time water resources data for Delaware river basin management agencies using ERTS-1 imagery
[E72-10107] N72-32359
Monitoring of reservoirs and water resources in Kansas using ERTS-1 imagery
[E72-10123] N72-32373

WATER RUNOFF
Development of land use-peak runoff classification system for highway engineering purposes in Maine using ERTS-1 imagery
[E72-10088] N72-32341

WATER VAPOR
Model of character and growth of stratiform cloud containing water in gas, liquid, and ice phases and of purely crystalline cloud
[NLL-RTS-7061] N72-32602

WATER WAVES
Refraction, shoaling, and friction of ocean waves reaching Port Phillip Heads, Australia
N72-32403
Relationships between wave height and period, and wind field characteristics in Bass Strait, Australia
N72-32404
Wind and wave characteristics and relationships in Bass Strait, Australia, over 17-year period
N72-32606

WATERSHEDS
Preparation of hydrologic atlases of arid land watersheds based on ERTS-1 imagery
[E72-10113] N72-32364

WAVE EQUATIONS
Expansion technique for rendering WKBJ wave equation method uniformly valid in underwater acoustics
[AD-742465] N72-32662

WAVE PROPAGATION
Propagation of radio waves through lower atmosphere of Venus and simplified model providing atmospheric attenuation factors
[NASA-TM-X-66046] N72-32185
Propagation and reception of partially coherent waves in random media
[AD-743833] N72-32194
Wave propagation along thin dielectric coated wire buried in earth
[AD-744078] N72-32199
Shock wave propagation in stellar atmospheric models
[NASA-TT-F-14438] N72-32315
Coupled-mode equations for wave propagation in medium modulated by multiple-frequency traveling wave studied with many-space-scale perturbation theory
[AD-743861] N72-32664
Partial differential equation solution for fourth moment of two dimensional plane wave propagating in random medium and multiscatter theories applied to atmospheric turbulence
[AD-744122] N72-32668
Reflection, transmission, and absorption coefficients for plane wave incident on plasma layer
[EUR-CEA-FC-627] N72-32703
Beam-plasma interactions and instabilities, and absolute instabilities with arbitrary propagation in mirror plasmas
[COO-1478-10] N72-32705

WAVE REFLECTION
Reflection, transmission, and absorption coefficients for plane wave incident on plasma layer
[EUR-CEA-FC-627] N72-32703

WAVE SCATTERING
Parametric processes and combination scattering of electromagnetic waves on plasmons in turbulent plasma excited by flux of charged particles in polar ionosphere
[NASA-TT-F-14589] N72-32414

WAVEGUIDES
Modular waveguide assembly consisting of orthogonally intersecting transmission lines coupled by two ferrite resonators
[JPRS-57102] N72-32186
Formulas for excitation of earth ionosphere waveguide by vertical electric Hertzian dipole
[AD-744241] N72-32197

WEAR
Scuff resistant properties of steel materials used to finish spur and helical gears
[AD-742655] N72-32503

WEAR TESTS
Use of profilograph recordings and microphotographs to determine single traces of impact and product of wear in abrasive erosion
[NLL-RTS-7374] N72-32488
Effects of graphite in powder alloy materials on friction and wear properties
[AD-744141] N72-32505
Antifriction properties and wear resistance of water lubricated friction bearings made of reinforced epoxy compositions
[AD-744289] N72-32510
Handbook on tests for abrasive wear in various materials and systems
[AD-744182] N72-32513
Comparative wear resistance of metal, phenols, and polyamide coatings
[AD-743825] N72-32558
Tribological characteristics of carbon fiber reinforced plastics, noting improved sliding wear against metal surfaces
[D-MAT-173] N72-32574

WEATHER FORECASTING
Pulse pair estimation of Doppler spectrum parameters for first second moments
[AD-744094] N72-32200
Cyclone intensity forecasting technique for Atlantic and Pacific
[NOAA-TM-NESS-42] N72-32607
Three dimensional staggered grid model based on Boussinesq equations applied to mesoscale atmospheric motions
[AD-742945] N72-32615
Severe weather air mass analysis, and forecasting severe weather
[AD-744042] N72-32616
Weather warning advisories and typhoon/hurricane warning procedures
[AD-741827] N72-32617
Methods of forecasting tropical cyclones and hurricanes
[AD-743763] N72-32628
Use of computer produced wind stratified conditional tables in weather forecasting
[AD-744521] N72-32637
Developing computer derived map into terminal forecasting system
[AD-744102] N72-32638
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - general findings and studies on international law, water resources management, and recreation
[NASA-CR-127335] N72-32974
Multidisciplinary studies of social, economic, and political impact of meteorological satellites - studies on earth resources utilization, agriculture, and commerce
[NASA-CR-127336] N72-32975

WEIGHTLESSNESS
Design and construction of prototype vent system for exhausting gas to space from all liquid or two phase mixture of oxygen
[NASA-CR-123826] N72-32844

WELD TESTS
Ultrasonic inspection of weldment in high pressure, high temperature tube
[TR-7205.584] N72-32494

WELDED JOINTS
Ultrasonic inspection of weldments on steel cylinder
[TR-7206.588] N72-32544
Ultrasonic inspection of weldments in cast iron cylinder
[TR-7206.587] N72-32545

WELDING
Computer enhancement of structural weld radiographs
[NASA-CR-123814] N72-32490
Numerical thermomechanical model for welding and loading of fabricated structure
[AD-744212] N72-32930

WHEAT
Evaluation of effect of water stress, disease and leaf area on reflectance characteristics, production, and prediction of disease severity and economic loss of wheat using ERTS-1 imagery
[E72-10126] N72-32374

WILDLIFE
Management of wildlife habitat in Alaska using ERTS-1 imagery data
[E72-10115] N72-32366

WIND [METEOROLOGY]
Relationships between wave height and period, and wind field characteristics in Bass Strait, Australia
N72-32404
Wind turbulence characteristics and temperature data over heterogeneous terrain at White Sands, New Mexico
[AD-743456] N72-32627
Use of computer produced wind stratified conditional tables in weather forecasting
[AD-744521] N72-32637

WIND EFFECTS
Stellar image perturbation caused by earth atmospheric temperature heterogeneities and wind speeds, and stellar image jitter amplitude measurement
[AD-744172] N72-32841

WIND MEASUREMENT
High altitude wind and temperature measurement data from meteorological sounding rockets, and radiosonde observations - Dec. 1970
N72-32603
Wind and wave characteristics and relationships in Bass Strait, Australia, over 17-year period
N72-32606

WIND TUNNEL MODELS
Dynamic stability measurement in wind tunnel of lifting body configurations at hypersonic speeds
[AU-648-PT-4] N72-32039
Wind tunnel flow field measurements around Mars lander model using hot-film anemometers under simulated Mars surface conditions
[NASA-TN-D-6820] N72-32853

WIND TUNNEL STABILITY TESTS
Full scale wind tunnel tests to determine dynamic stability derivatives of variable-sweep fighter configuration with twin vertical tails
[NASA-TN-D-6909] N72-32044

WIND TUNNEL WALLS
Wind tunnel wall corrections for two-dimensional flow applied to pressure distribution measurements in transonic wind tunnel
[NASA-TT-F-14316] N72-32264

WINDING
Theoretical and practical aspects of coil windings within superconducting magnets for proton synchrotron
[RPP/A-88] N72-32661

WINDS ALOFT
Atmospheric density, temperature, and winds at high altitudes
[AD-742325] N72-32611

WING PLANFORMS
Waverider prediction of hypersonic behavior of wing planforms
N72-31997
Thin shock layer theory for determining flow pattern around conical wings
N72-31998
Momentum theory for optimum design of wing surfaces
N72-31999

WING PROFILES
Numerical computation of transonic flow around leading edge of wing profile
[NASA-TT-F-14285] N72-32010

WINTER
Study of caribou movements and winter dispersal in Alaska in relation to prevailing snow cover using ERTS-1 imagery
[E72-10134] N72-32382

WIRE
Wire dispensers for study of artificial triggering of lightning strokes
[AD-743863] N72-32625

WISCONSIN
Environmental impact statement on proposed development of Neillsville Municipal Airport, Neillsville, Wisconsin
[PB-204576-F] N72-32274

WORKING FLUIDS
Operation of power plant on planet utilizing atmosphere as working fluid
[NASA-TT-F-14505] N72-32074

WYOMING
ERTS-1 imagery of geological, botanical, and agricultural features of Wyoming and applications to inventory and management of natural resources
[E72-10079] N72-32339

X

X RAY DIFFRACTION
X ray diffraction models for nonspecialists
[ARL/MET-78] N72-32539

X RAY INSPECTION
Background compensated X ray radiometric logging in nuclear geophysical investigations
[NLL-RTS-6739] N72-32451
Nondestructive X ray topographic study of slip distribution in single alpha-SiC crystals
[AD-744076] N72-32730

X RAY SPECTROSCOPY
Raman and X ray spectroscopy of lunar glasses and scanning electron microscopy of lunar fines
[NASA-CR-128534] N72-32805

X RAY TELESCOPES
Design studies for X ray experiment using solid state detectors or proportional counter for exploring magnetospheres of Saturn and Jupiter and cosmic X ray sources
[NASA-CR-128250] N72-32455

X RAYS
Galactic X ray sources
[ASE-30661] N72-32784
Measurement of cosmic X rays in region of 20 eV to 1 keV with argon proportional counter photoionization device
[NASA-CR-130064] N72-32786
Design and construction of grazing incidence telemetering monochromators for observing solar far ultraviolet and soft X ray radiation
[AD-743835] N72-32793
XENON
Absolute radiation intensity of continuum and line emission spectra of shock-heated xenon
[AD-744271] N72-32328
XENON LAMPS
Efficient optical pumps using xenon lamp with clad erbium silicate glass laser material
[AD-744480] N72-32532
XV-4 AIRCRAFT
Effects of variations in stability derivatives on performance of XV-4 aircraft
[AD-744104] N72-32066

Y

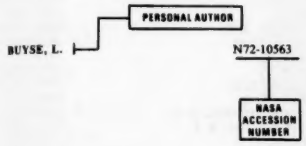
YAWING MOMENTS
Aero-normalized yawing moment derivatives
[ESDU-71017] N72-31988
Effect of fin and rudder on rolling moments due to sideslip and yawing
[ESDU-70006] N72-31992
YIELD POINT
Slip systems in Al2O3 and yielding in sapphire undergoing basal slip
[AD-743980] N72-32741

Z

ZIRCALOY 2 [TRADEMARK]
Electrochemical measurement of corrosion rates of carbon steel, stainless steel, and Zircaloy 2 operating in high temperature environments
[STU-70-394/U-325] N72-32158
ZIRCONIUM
Atomic structure of Zr-93 and Zr-91 studied from stripping and pickup reactions induced by 13-MeV incident deuterons on Zr-92
[NASA-TN-D-6911] N72-32673
ZONAL HARMONICS
Zonal geopotential to degree 21 based on mean orbital elements for 21 satellites
[NASA-TM-X-66039] N72-32402

PERSONAL AUTHOR INDEX

TYPICAL PERSONAL AUTHOR INDEX LISTING



Listings in this index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABBOTT, J. M. N72-32765
ABE, Z. N72-32114
ABEND, K. N72-32201
ADAMS, F. D. N72-32483
N72-32533
ADAMS, J. R. N72-32490
ADELMAN, H. M. N72-32887
ADOLPH, C. F. N72-32025
AGNELLO, V. N72-32703
AHLBORN, B. N72-32522
AIKEN, A. C. N72-32395
AIVAZYAN, R. B. N72-32684
ALCALY, D. N72-32106
ALDRICH, R. C. N72-32337
ALEKSIN, V. F. N72-32700
ALEXANDER, A. D., III N72-32742
ALEXANDER, R. H. N72-32342
ALGER, D. L. N72-32542
ALGERMISSEN, J. N72-32940
ALLEN, G. N72-32590
ALLEN, M. N72-32882
ALLISON, L. J. N72-32462
ALPER, S. N72-32284
AMATO, R. N72-32336
AMBARTSUMYAN, S. A. N72-32924
AMFILOKHIYEV, V. B. N72-32304
ANCKER-JOHNSON, B. N72-32731
ANDERSON, A. D. N72-32390
ANDERSON, D. L. N72-32806
ANDERSON, J. H. N72-32385
ANDERSON, K. A. N72-32455
ANDERSON, N. R. N72-32796
N72-32797
N72-32800
N72-32802
ANDERSON, R. O. N72-32036
ANDERSON, S. B. N72-32021
ANDREWS, S. J. N72-32019
ANDRIULLI, J. B. N72-32843
ANGELE, W. N72-32222
N72-32231
ANGLIN, E. L. N72-32044
ANISIMOV, S. I. N72-32540
ANOMATA, K. N72-32151
ANPILOGOV, I. V. N72-32103
ANTHONY, T. R. N72-32562
ANTONOV, Y. I. N72-32467
ARAI, K. N72-32908
ARHO, R. N72-32858
ARIFOV, U. A. N72-32667
ARMENDARIZ, M. N72-32627
ARNOLD, R. R. N72-32910
ARON, G. M. N72-32252
ARONOVA, Y. N. N72-32090
ARONSON, R. B. N72-32053
ASCHOFF, J. C. N72-32093
ASHCRAFT, A. C., JR. N72-32743
N72-32767
ASTRAVIN-RAZUMIN, D. L. N72-32824
ATHANS, M. N72-32639
ATTMANNSPACHER, W. N72-32612
AUCKLAND, J. C. N72-32441
AULITSKY, H. N72-32398
AUSFRESSER, H. N72-32462
AVAKYAN, K. M. N72-32684
AYRAPETYANTS, E. S. N72-32084

B

BABCOCK, S. G. N72-32557
BABIC, M. N72-32697
BABICHEV, M. A. N72-32513
BABKIN, V. G. N72-32209
BACA, J. P. N72-32728
BADEKAS, J. N72-32444
BAEV, S. V.
BAGRAMOV, V. G.
BAILEY, R. W.
BALLARD, G. S.
BAMBAKIDIS, G.
BANKS, B. A.
BANTA, F. L.
BAR-SHALOM, Y.
BARBER, D.
BARBOSA, M. F.
BARINOV, M. T.
BARLIER, F.
BARNES, E. R.
BARNES, J. A.
BARON, N.
BARRERE, M.
BARTLETT, D.
BASHARA, N. M.
BASSETT, F.
BASTUSCHECK, C. P.
BATES, H. E.
BATTLE, G. C., JR.
BAUM, B. A.
BAUM, D. R.
BAZHULIN, P. A.
BEAL, S. K.
BECKER, L. C.
BECKER, R. L.
BECKER, W.
BEHANNON, K. W.
BELITSKAYA, R. A.
BELL, B.
BELON, A. E.
BELOTSKII, A. V.
BELOUSOV, S. L.
BELY, O.
BELYKH, V. S.
BENDER, C. F.
BENEK, J. A.
BENHAM, F. C.
BENSON, C. S.
BENTLEY, G.
BERCHTOLD, J. P.
BEREZIN, A. B.
BERKOVITS, A.
BERNOTAT, R. K.
BINNEY, S. E.
BINSTOCK, J.
BIRGER, B. I.
BIRKHEAD, N. C.
BITTNER, L.
BLISS, E. S.
BLIZZARD, J. J.
BLOCK, L. P.
BLOOM, E. E.
BLOOM, M. H.
BLUM, E. J.
BOCHAROV, V. G.
BOCHNEAK, D.
BOCIAN, E. S., JR.
BODE, H.
BODENLOS, A. J.
BOEHM, E.
BOEHM, H.
BOEHMER, R. P.
BOGDANCHENKO, N. M.
BOGDANOV, D. D.
BOGDANOVICH, M. P.
BOGORODITSKII, A. A.
BOLEGER, F. T.
BOLTON, R. L.
BONDAREV, G. I.
BONNEMAY, A.
BONNYCASTLE, R. J.
BOOM, R. W.
N72-32925
N72-32481
N72-32579
N72-32454
N72-32652
N72-32760
N72-32575
N72-32064
N72-32574
N72-32544
N72-32545
N72-32005
N72-32399
N72-32595
N72-32130
N72-32673
N72-32749
N72-32751
N72-32370
N72-32723
N72-32642
N72-32485
N72-32718
N72-32572
N72-32561
N72-32566
N72-32142
N72-32787
N72-32421
N72-32652
N72-32678
N72-32836
N72-32464
N72-32107
N72-32790
N72-32262
N72-32560
N72-32636
N72-32680
N72-32640
N72-32159
N72-32768
N72-32200
N72-32377
N72-32343
N72-32104
N72-32702
N72-32547
N72-32035
N72-32205
N72-32775
N72-32943
N72-32085
N72-32588
N72-32534
N72-32085
N72-32420
N72-32555
N72-32713
N72-32469
N72-32700
N72-32119
N72-32244
N72-32073
N72-32387
N72-32213
N72-32552
N72-32279
N72-32280
N72-32640
N72-32477
N72-32561
N72-32465
N72-32966
N72-32318
N72-32090
N72-32233
N72-32176
N72-32716
BOORNAZIAN, A. N72-32263
BOORSE, R. T. N72-32215
BOOTH, L. A. N72-32521
BORISEVICH, N. A. N72-32653
BORN, R. M. N72-32436
BOROVIN, G. K. N72-32499
BOSSOLASCO, M. N72-32411
BOURG, H. J. N72-32237
BOURGELAS, F. N. N72-32165
N72-32953
BOYNTON, F. P. N72-32633
BOZICH, R. N72-32615
BRALEY, R. C. N72-32678
BRANDHORST, H. W., JR. N72-32229
BRANTON, C. I. N72-32386
BRAUN, E. G. N72-32579
BRAY, K. N. C. N72-32003
BRENTON, J. G. N72-32424
N72-32440
BROCKWAY, G. S. N72-32926
BRODERSEN, A. J. N72-32724
BROERS, A. N. N72-32250
BROOKS, F. C. N72-32582
BROVES, G. V. N72-32611
BROWN, A. W. N72-32218
BROWN, R. D. N72-32401
BROWN, W. P., JR. N72-32668
BRUCE, J. A. N72-32730
BRUECKNER, A. N72-32235
BRUNEAU, C. M. N72-32152
N72-32153
BRUNER, R. F. N72-32323
BUCHELE, D. R. N72-32459
BUCHNER, K. N72-32657
BUCKLEY, D. H. N72-32571
BUIKOV, M. J. N72-32597
N72-32598
N72-32599
N72-32600
N72-32601
N72-32602
BURAK, Y. I. N72-32922
BURCH, J. L. N72-32683
BURDET, C. A. N72-32409
BURLAGA, L. F. N72-32850
BURNS, W. C. N72-32480
BUTLER, T. G. N72-32870
BUZNIKOV, A. A. N72-32466
BYALYUK, V. D. N72-32214
BYERS, D. C. N72-32760

C

CAMPBELL, D. V. N72-32247
CAMPBELL, S. N72-32056
CAMPOS, A. B. N72-32848
CAREY, K. L. N72-32429
CARLON, H. R. N72-32631
CARLSON, H. C. N72-32446
CARLSON, J. M. N72-32869
CARLSON, J. W. N72-32018
CARLSON, R. F. N72-32383
CARPENTER, L. N72-32851
CARTER, V. N72-32320
CASLIN, J. C. N72-32594
CAST, L. D. N72-32344
CASTELLI, J. P. N72-32791
CASTI, J. A. N72-32065
CERESUELA, R. N72-32749
N72-32753
CERKANOWICZ, A. E. N72-32168
CHALK, C. R. N72-32022
CHALLANDE, R. N72-32413
CHAMBELLAN, R. E. N72-32763
CHAMBERS, J. A. N72-32621
CHAO, H. N72-32918
CHAVE, K. N72-32423
CHAYKA, M. P. N72-32666

CHEBAN, A. G. N72-32075
CHEN, W. S. N72-32731
CHENETTE, E. R. N72-32724
CHERKESOV, L. V. N72-32327
CHERNOGLAZOV, V. A. N72-32772
CHERNOUSKO, F. L. N72-32312
CHERRIX, G. T. N72-32462
CHI-DIANGO, J. N72-32899
CHIN, M. N72-32184
CHOE, C. Y. N72-32807
CHOU, Y. T. N72-32281
CHOUKROUN, J. N72-32106
CHRISTMAN, D. R. N72-32557
CHRISTOPHER, E. J. N72-32249
CHYSTYUKHIN, V. O. N72-32923
CIEPLUCH, C. C. N72-32043
CIPOLLETTI, D. N72-32832
CLARK, H. K. N72-32484
CLARK, R. L. N72-32487
CLARK, R. R. N72-32434
COCKS, F. H. N72-32718
COENSGEN, F. H. N72-32706
COHEN, M. H. N72-32739
COLCLASER, R. A. N72-32728
COLEN, P. N72-32216
N72-32217
COLES, W. D. N72-32715
COLLI, A. J. N72-32744
COLLINS, H. E. N72-32567
COLVOCORESSES, A. P. N72-32345
COMPTON, H. R. N72-32834
COMTE-BELLOT, G. N72-32314
CONRAD, E. W. N72-32043
CONRATH, B. J. N72-32418
COOK, F. H. N72-32191
COOK, H. A. N72-32286
COOK, J. P. N72-32376
COOPER, B. M. N72-32892
COOPER, W. A. N72-32285
CORWIN, R. R. N72-32483
COUCH, L. W. N72-32196
COUPLAND, J. H. N72-32661
COX, R. C. N72-32435
COYLE, R. A. N72-32539
CRANNELL, C. J. N72-32463
CRANNELL, H. N72-32463
CROSE, J. G. N72-32859
CROSLEY, J. K. N72-32579
CROSS, F. T. N72-32123
CRUZ, J. E. N72-32460
CUMMINS, H. Z. N72-32536
CUMMINS, W. F. N72-32706
CUNNINGHAM, G. G. N72-32570
CUSICK, J. P. N72-32652

D

DAGNINO, I. N72-32411
DALKEY, N. N72-32589
DANCHAK, P. I. N72-32906
DANIEL, J. F. N72-32346
DANIELS, E. F. N72-32834
DANN, J. E. N72-32221
DAVID, B. N72-32413
DAVIS, J. C. N72-32372
DAVIS, T. J. N72-32259
DAWSON, J. M. N72-32704
DEBRUYNE, N. N72-32503
DECELL, H. P., JR. N72-32587
DECKER, J. R. N72-32141
DEHMELT, K. N72-32073
DEKHTYAR, M. I. N72-32597
N72-32598
N72-32599
N72-32600
N72-32601
DELUCA, L. N72-32074
DEMIDOVICH, V. M. N72-32772
DENISOV, Y. D. N72-32307
DENKMANN, W. J. N72-32236
DEQUE, R. N72-32032
DERYAGIN, B. N72-32149
DESILVA, B. M. E. N72-32903
DEWOLF, D. A. N72-32535
DIEBOLD, G. N72-32161
DIEMER, K. N72-32108
DILLARD, J. L. N72-32150
DISSEN, H. N72-32755
DMITRIEV, G. N. N72-32647
DMITRIEV, G. P. N72-32512
DOBYNS, A. L. N72-32580
DOETSCH, K., JR. N72-32033
DOIHARA, T. N72-32154
DONALDSON, C. D. N72-31993
DONN, B. D. N72-32850
DOROFEEV, G. L. N72-32720
DOSSIN, F. N72-32829
DREWERY, M. A. N72-32171
DRISCOLL, R. S. N72-32337
DROEGE, K. N72-32492
DRUCKER, E. E. N72-32954
DRUMMOND, A. J. N72-32780
DRUMMOND, A. M. N72-32310
DRUMMOND, W. E. N72-32709
DRUXES, H. N72-32693
DUBOVOI, L. V. N72-32702
DUCATI, A. C. N72-32691
DUDLEY, D. P. N72-32871
DUDZINSKI, T. J. N72-32316
DUFF, E. A. N72-32192
DUMAS, R. J. N72-32078
DUNBAR, J. C. N72-32641
DUNN, E. N72-32267
DUPUIS, M. N72-32593
DURAND, M. N72-32883
DUSHIN, L. A. N72-32708
DUTTON, J. H. N72-32873
DZVONYK, L. I. N72-32325

E

EARL, J. A. N72-32776
EARLEY, R. N72-32774
ECKEL, O. N72-32407
EDSON, D. T. N72-32347
EFIMOV, A. B. .. N72-32909
EGBERT, D. N72-32372
ELTERMANN, H. N72-32591
ENGLER, N. A. N72-32415
ENGLUND, D. R., JR. N72-32458
ENISON, R. L. N72-32207
ERDELYI, E. A. N72-32077
ERGENE, A. N72-32238
ERICKSON, C. O. N72-32607
ERICKSON, P. W. N72-32577
ERMAKOV, V. G. N72-32465
EROKHIN, B. T. N72-32941
ESAKI, L. N72-32740
ESHEL, A. N72-32495
ESPY, P. N. N72-32688
ESTES, H. M., JR. N72-32984
EVANS, D. S. N72-32683
EVANS, J. C., JR. N72-32229
EVERSTINE, G. C. N72-32893
EYERMANN, K. N72-32051

F

FAIGEN, I. M. N72-32238
FALCONER, R. L. N72-32403
N72-32404
N72-32606
FAN, J. C. C. N72-32735
FANG, T. C. N72-32655
FANTE, R. L. N72-32664
FARMER, B. J. N72-32833
FARMER, L. D. N72-32425
FARQUHAR, R. W. N72-32810
N72-32850
FAY, R. J. N72-32957
FEDOROV, I. I. N72-32941
FEDOSENKO, V. S. N72-32327
FEE, J. J. N72-32184
N72-32849
FELDMAN, D. N72-32733
FERRIANS, O. J., JR. N72-32333
FERTIG, K. W. N72-32745
FETTIS, H. E. N72-32594
FIEFFE-PREVOT, P. N72-32703
FIELDS, V. C. N72-32625
FINK, C. L. N72-32673
FIRESTONE, R. F. N72-32741
FISHER, E. R. N72-32633
FITAIRE, M. N72-32660
FLETCHER, D. L. N72-32201
FLOCCHINI, G. N72-32411
FONER, S. N72-32722
FORD, W. F. N72-32678
FORREST, J. B. N72-32916
FORSEN, H. K. N72-32687
FORTINI, A. N72-32501
FOSSUM, H. J. N72-32731
FOUGHNER, J. T., JR. N72-32853
FRANK-KAMENETSKIY, D. A. N72-32315
FRANK, D. E. N72-32255
FRANKEL, S. N72-32241
FREEMAN, D. L. N72-32628
FREYNIK, H. N72-32478
FREYRE, O. L. N72-32058
FRIEDE, G. N72-32946
FRIEDMAN, A. J. N72-32738
FRIEDMAN, J. D. N72-32334
FROST, A. D. N72-32434
FROST, D. N72-32263
FUGATE, G. M. N72-32621
FUKAMACHI, T. N72-32496
FUKS-RABINOVICH, M. S. N72-32636

G

GAFAIZEN, O. V. N72-32188
GALAMBOS, R. N72-32081
GALLAGHER, J. T. N72-32026
N72-32282
GALLON, M. N72-32303
GALVIN, D. M. N72-32799
GAMACOS, C. N72-32802
GAMALEYA, N. F. N72-32201
GANS, R. N72-32516
GARCIA, R. N72-32550
GARRAHAN, N. M. N72-32552
GASAWAY, D. C. N72-32226
N72-32052
N72-32670
GAUCH, M. N72-32717
GAUCHER, D. W. N72-32195
GAUNTNER, J. W. N72-32949
N72-32950
GAVIGLIO, J. N72-32475
GAWIN, J. N72-32686
GEARHART, J. W. N72-32768
GEBEL, R. K. H. N72-32240
GEDNEY, L. N72-32378
GELD, P. V. N72-32566
GELPERIN, N. I. N72-32932
GEORGE, R. E. N72-32048
GERASHNCHENKO, O. A. N72-32486
GERATHEWOHL, S. J. N72-32131
GERBSTADT, F. N72-32216
N72-32217
GERMAN, R. M. N72-32319
GERSCH, H. N72-32266
GHAIS, A. F. N72-32178
N72-32179
GHEZZI, U. N72-32074
GIANFORMAGGIO, A. N72-32797
N72-32800
N72-32802
GILHOUSEN, K. S. N72-32206
GILLIS, M. F. N72-32141
GILLY, C. N72-32122
GILMARTIN, D. E. N72-32162
GIRARD, E. W. N72-32284
GITERMAN, M. S. N72-32164
GLADDEN, H. J. N72-32949
GLAGOLEV, A. I. N72-32305
GLOSSBRENNER, E. W. N72-32230
GNANALINGAM, S. N72-32778
GOEBEL, R. A. N72-32142
GOLDBERG, R. A. N72-32395
GOLDSCHMIDT, M. A. N72-32415
GOLLIDAY, C. L., JR. N72-32202
GONCHAROV, I. N. N72-32720
GONCHAROV, V. K. N72-32520
GOODSON, R. E. N72-32330
GORANSSON, G. N72-32223
GORCHAK, L. V. N72-32075
GORDON, W. E. N72-32446
GOULD, D. H. N72-32245
GOZULOV, S. A. N72-32101
GRAFTON, S. B. N72-32044
GRAHAM, L. D. N72-32567
GRAVEN, W. M. N72-32480
GREBENNIKOV, A. I. N72-32256
GREBERT, A. N72-32216
N72-32217
GREENBERG, O. W. N72-32675
GREENE, G. C. N72-32853
GREENING, L. R. N72-32875
GREENSTREET, W. L. N72-32572
GREGORY, D. J. N72-32888
GRIFFIN, D. F. N72-32916
GRIGOLYUK, E. I. N72-32922
GRIGORYEV, Y. G. N72-32107
GRINGORTEN, I. I. N72-32624
GROGINSKY, H. L. N72-32200
GRUVER, R. M. N72-32576
GRYBECK, D. N72-32379
GRYC, G. N72-32348
GUALTIEROTTI, T. N72-32139
GUIDICE, D. A. N72-32791
GULDI, R. L. N72-32727
GURSKY, H. N72-32784
GUSEV, N. A. N72-32406
GUSTAFSSON, G. N72-32783
GUSTIN, W. M. N72-32211

H

HAAS, D. W. N72-32847
HAGENBUCH, K. M. N72-32391
HAGGENMACHER, G. W. N72-32885
HAGIN, W. V. N72-32142
HALL, A. W. N72-32045
HALLBERG, G. R. N72-32489
HAMITER, M. A. N72-32527
N72-32632
HAMZAWI, S. G. N72-32972
HANCOCK, G. J. N72-32029
HANKEY, W. L. N72-32002
HANLEIN, S. L. N72-32886
HARALICK, R. M. N72-32203
N72-32453
HARDEN, C. S. N72-32163
HARDY, J. N72-32232
HARPER, R. P., JR. N72-32028
HARRIS, J. A., JR. N72-32145
HARRIS, W. N72-32125
HARRISON, R. P. N72-32625
HARTWELL, A. D. N72-32429

HARVEY, W. D. N72-32318
HARWOOD, H. D. N72-32170
HASAMA, B. N72-32095
HASBACH, W. A. N72-32070
HASHIMOTO, T. N72-32096
HATORI, T. N72-32694
HATZAKIS, M. N72-32250
HAUSSLING, H. J. N72-32331
HAWLEY, S. W. N72-32490
HAYSLETT, R. R. N72-32240
HAYWARD, R. A. N72-32526
HCRISTENSEN, P. R. N72-32673
HEARSEY, R. M. N72-32756
HEATH, D. F. N72-32417
HEIN, G. F. N72-32182
HEINRICH, H. G. N72-32063
HEINRICHS, J. A. N72-32849
HELD, M. N72-32935
HELLER, J. A. N72-32206
HELLER, R. C. N72-32337
HENCH, L. Z. N72-32724
HENNING, A. B. N72-32855
HENRY, D. G. N72-32251
HERXHEIMER, H. N72-32098
HEUER, A. H. N72-32741
HIBBITT, H. D. N72-32930
HIBNER, J. N72-32686
HICKS, G. V. N72-32966
HIESTER, A. E. N72-32460
HILL, J. G. N72-32575
HILL, J. S. N72-32721
HILL, R. G. N72-32879
HILSENRATH, E. N72-32417
HIRST, G. C. N72-32625
HITZFELDER, S. J. N72-32775
HIXSON, W. C. N72-32061
HNATEK, A. N72-32461
HOFFER, R. M. N72-32340
N72-32368
HOFFMAN, C. A. N72-32541
HOFFMAN, R. A. N72-32683
HOFMANN, M. A. N72-32120
N72-32476
N72-32649
HOGAN, L. R. N72-32804
HOLDEMAN, J. D. N72-32939
HOLKO, K. H. N72-32500
HOLLYDAY, E. F. N72-32349
HONEYCUTT, G. H. N72-32886
HOOVER, W. G. N72-32159
HORN, W. A. N72-32648
HORNE, R. S. N72-32058
HOSMAN, R. J. A. W. N72-32034
HOUSTON, R. S. N72-32339
HOWELL, J. D. N72-32137
HUA, L. N72-32895
HUCKE, E. E. N72-32564
N72-32565
HUEBNER, W. N72-32158
HUFF, R. J. N72-32202
HUFFMAN, H. W. N72-32476
HUGON, J. S. N72-32104
HUMBERT, S. B. N72-32529
HUMPHREY, W. D. N72-32766
HUNTER, R. E. N72-32350
HUSEBYE, E. S. N72-32447
HUTTO, G. L. N72-32121
HYMAN, B. I. N72-32917

I

ICHTCHENKO, G. N72-32703
ILIN, V. Y. N72-32467
IMAS, I. A. N72-32540
IMESON, T. C. N72-32163
IMRICH, T. N72-32644
IONNISIANI, B. K. N72-32449
IREMASHVILI, D. V. N72-32481
ISBELL, W. M. N72-32557
ISHIMARU, A. N72-32194
ISSEKUTZ, B., JR. N72-32085
IVANOV, A. I. N72-32586
IVANOV, K. G. N72-32785
IVANOVSKY, A. I. N72-32416

J

JACK, D. C. N72-32580
JACKSON, C. E., JR. N72-32898
JACKSON, W. M. N72-32850
JACOBOWITZ, H. N72-32780
JACOBS, I. M. N72-32206
JANETZKE, R. W. N72-32683
JANKOVICH, E. N72-32883
JANSEN, G. N72-32099
JELACIC, A. N72-32371
JELINEK, F. N72-32206
JENNINGS, W. C. N72-32689
JINES, R. H. N72-32054
JOHANSSON, B. N72-32158
JOHNSON, D. L. N72-32578
JOHNSON, E. H. N72-32515
JOHNSON, L. F. N72-32472
JOHNSON, R. N72-32781
JOHNSON, R. C. N72-32316
JOHNSTON, H. N72-32160
JONES, A. G. N72-32066
JONES, J. G. N72-32030
JONES, W. V. N72-32463
JORDAN, J. E. N72-32119
JORDON, A. J., JR. N72-32890
JOU, W. N72-32710
JUDD, G. N72-32253
JUDD, J. H. N72-32487

K

KAHRS, J. H., III N72-32283
KALAKOWSKY, C. B. N72-32625
KALCHENKO, G. T. N72-32596
KALITEEVSKII, N. I. N72-32666
KAMDAR, M. H. N72-32568
KAMINSKI, J. L. N72-32059
KAMMASH, T. N72-32705
KANEMASU, E. T. N72-32374
KANEN, G. M. N72-32643
KANTNER, E. N72-32071
KARIZHENSKIY, Y. Y. N72-32406
KARMASHEV, A. V. N72-32787
KARNAUKHOV, V. A. N72-32477
KARPOV, I. I. N72-32499
KATO, K. N72-32154
KATON, J. E. N72-32166
KATONA, M. G. N72-32916
KATSANIS, T. N72-32759
KATTAWAR, G. W. N72-32775
KAUTZ, E. F. N72-32060
KAYS, M. D. N72-32437
KAZANSKAYA, Y. P. N72-32091
KAZANSKII, V. V. N72-32667
KEAFER, L. S., JR. N72-32853
KEELER, C. M. N72-32429
KEHRER, W. T. N72-32027
KELLER, G. V. N72-32432
KELLY, B. M. N72-32891
KELLY, G. N72-32203
KELSALL, T. N72-32811
KEMPA, J. N72-32686
KENNEDY, D. P. N72-32732
KERN, R. N72-32717
KESNER, Z. N72-32658
KHALAFALLA, S. E. N72-32659
KHAZEN, I. M. N72-32107
KHILOV, K. L. N72-32133
KHMELNIK, M. I. N72-32299
KHODYKO, I. V. N72-32540
KHOLSHCHEVNIKOV, K. V. N72-32773
KHRAPOVITSKIY, V. G. N72-32005
KHRUSHCHOV, M. M. N72-32513
KHUKHAREVA, I. S. N72-32720
KIMBALL, K. A. N72-32649
KIPPENHAHN, R. N72-32835
KIRCHNER, H. P. N72-32576
KISELEV, Y. F. N72-32234
KISLYAKOVSKIY, A. V. N72-32186
KISSEL, G. K. N72-32024
KLEIS, I. R. N72-32488
KLEMAS, V. N72-32369
N72-32370
KLEPIKOV, N. P. N72-32389
KLINE, E. M. N72-32677
KLOPFER, A. N72-32629
KNIGHT, J. M. N72-32156
KNIGHTON, D. J. N72-32191
KOBRYNSKI, M. N72-32877
KOCHEROV, P. V. N72-32047
KOFSKEY, M. G. N72-32566
KOLKER, I. G. N72-32072
KOMEMUSHI, S. N72-32062
KOMPA, K. L. N72-32086
KONDRATEV, K. I. N72-32522
KORZHEN'YANTS, V. A. N72-32466
KOSCO, W. J. N72-32101
KOSLOVSKAYA, N. N. N72-32351
KOSMOLINSKIY, F. P. N72-32699
KOSY, D. W. N72-32107
KOTELLY, J. C. N72-32210
KOTLYAR, Y. M. N72-32438
KOVAL, I. K. N72-32509
KOVALENKO, V. A. N72-32817
KOZERENKO, O. P. N72-32821
KRAPENKO, V. G. N72-32088
KRAUS, H. N72-32486
KRAUSE, L. N. N72-32604
KRAUSS, R. W. N72-32316
KRESSEL, H. N72-32082
KRICHEL, R. N72-32719
KRINSLEY, D. B. N72-32693
KRUEGER, A. J. N72-32352
KRULAC, I. L. N72-32417
KRYLOV, Y. V. N72-32239
KRYVORUKA, J. K. N72-32089
KUBLANOVA, P. S. N72-32049
KUBOTA, H. N72-32094
KUEHNEL, H. A. N72-32936
KUEHNEL, M. N72-32852
N72-32505
KUHNKE, E. N72-32109
KULINSKI, S. N72-32703
KUMMLER, R. H. N72-32633
KUNDE, V. G. N72-32418
KURUSHIN, M. I. N72-32497
KUSHCH, S. N. N72-32186
KUZMIN, A. D. N72-32831

L

LABAT, J. N72-32157
LABORDE, D. A. N72-32528
LADANY, I. N72-32719
LAGET, M. N72-32840
LAMBECK, K. N72-32399
LAMPART, C. R. N72-32059
LANDGREBE, D. A. N72-32368
LANDRY, M. J. N72-32524
LANDS, J. F., JR. N72-32857
LAPORTE, T. R. N72-32016
LARCHE, K. N72-32470
N72-32471
LARSON, J. V. N72-32577
LATHRAM, E. H. N72-32348
LAU, M. N72-32105
LAURENCE, J. N72-32716
LAURIG, W. N72-32092
LAUVSTAD, V. R. N72-32662
LAZZARI, J. N72-32187
LEAK, W. M. N72-32977
LEBEDINETS, V. N. N72-32837
LECCE, J. V. N72-32745
LEE, H. N72-32897
LENT, P. C. N72-32382
LEONARD, L. N72-32507
LEONARD, R. F. N72-32673
LEONTYEV, N. I. N72-32481
LEPPER, C. M. N72-32227
LEPPING, R. P. N72-32464
LESCO, D. J. N72-32459
LESCURE, W. J. N72-32970
N72-32971
LESUER, R. F. N72-32020
LEVERENZ, R. K. N72-32876
LEVIN, Y. S. N72-32566
LEVY, A. N72-32902
LEVY, M. E. N72-32168
LEWIS, E. A. N72-32625
LEWIS, N. E. N72-32230
LEZAL, D. N72-32736
LI, S. S. N72-32724
LIBBY, L. M. N72-32634
LIEBENBERG, D. H. N72-32573
LIEBER, A. J. N72-32479
LIFSHITS, Y. B. N72-32010
LIMANSKY, I. N72-32237
LINDHOLM, F. A. N72-32724
LINFORTH, D. J. N72-32606
LIPPOLT, H. J. N72-32830
LITVINENKO, O. K. N72-32427
LIU, D. C. N72-32155
LIU, H. N72-32397
LIVINGOOD, J. N. B. N72-32950
LIVSHITS, M. A. N72-32701
LOENDORF, D. D. N72-32884
LONGSDERFF, R. W. N72-32952
LUCIAN, M. L. N72-32585
LUDWIG, A. C. N72-32169
N72-32232
LUGOVSKOI, V. B. N72-32667
LUGT, H. J. N72-32324
N72-32331
LUKYANOVA, L. D. N72-32091
LUNDBERG, K. N72-32158
LUNDGREN, S. N72-32039
LUNDSTROM, R. R. N72-32855
LUPTON, J. E. N72-32777
LUTHER, R. N. N72-32843
LYUBLIN, B. V. N72-32702

M

MACAGNO, E. O. N72-32265
MACDONALD, W. R. N72-32355
MACKRODT, P. N72-32264
MADSEN, R. F. N72-32637
MAECKER, H. H. N72-32714
MAIER, K. N72-32111
MAKARON, V. S. N72-32757
N72-32758
MAKHANKOV, V. G. N72-32711
MALONE, G. A. N72-32502
MALYSHKIN, V. N. N72-32821
MANN, J. Y. N72-32907
MANNKOPFF, R. N72-32946
MAPLE, R. D. N72-32198
MARCAL, P. V. N72-32930
MARFENINA, I. V. N72-32945
MARGUET, R. N72-32749
N72-32750
N72-32752
MARINI, J. W. N72-32812
MARKARENKO, V. V. N72-32667

MARKOV, M. N. N72-32787
MARPLE, C. G. N72-32853
MARRS, R. W. N72-32339
MARSH, D. S. N72-32320
MASHIKO, Y. N72-32151
MASHKOVICH, S. A. N72-32636
MASLEN, S. H. N72-32297
MASON, J. B. N72-32897
MASSON, A. N72-32717
MATEVOSYAN, E. M. N72-32684
MATSNEV, E. I. N72-32088
MATSUDA, S. N72-32671
MATSUI, T. N72-32794
MATSUSHITA, S. N72-32519
MATTSON, H. L. N72-32797
N72-32802
MAYERS, J. N72-32921
MCAVOY, R. J. N72-32050
MCCARTHY, D. K. N72-32850
MCCHESNEY, J. F. N72-32683
MCCLENAHAN, J. O. N72-32474
MCCULLOUGH, J. E. N72-32857
MCDOUGALL, D. W. N72-32265
MCELROY, J. H. N72-32515
MCERLEAN, D. P. N72-32326
MCEWEN, R. B. N72-32353
MCGANN, W. E. N72-32228
MCGOWAN, J. J. N72-32915
MCGRATH, J. F., JR. N72-32793
MCINTOSH, J. A. N72-32426
MCKEE, E. D. N72-32354
MCKINLEY, T. K. N72-32859
MCLEAN, F. G. N72-32875
MCNALLY, J. R., JR. N72-32651
MEHRA, R. K. N72-32065
MEHRBACH, E. N72-32798
N72-32802
MEIER, L. N72-32064
MEIER, M. F. N72-32356
MEIER, V. A. N72-32451
MELLER, E. N72-32921
MELLOR, F. A. N72-32454
MENEES, G. P. N72-32317
MENZEL, D. H. N72-32790
MERCIER, I. M. N72-32422
MERGERIAN, D. N72-32237
MESSE, L. A. N72-32143
MESTWERDT, H. R. N72-32240
METOIS, J. J. N72-32717
MICHAELSEN, O. E. N72-32023
MICHELINI, R. D. N72-32263
MIEMAN, R. L. N72-32638
MIGEOTTE, M. V. N72-32445
MIKELSON, D. A. N72-32090
MIKHAILOV, V. V. N72-32923
MIKHAYLOV, V. N. N72-32301
MIKULAS, M. M., JR. N72-32911
MILLER, B. N72-32574
MILLER, B. A. N72-32765
MILLER, C. G., III N72-32300
MILLER, G. P. N72-32967
MILLER, R. C. N72-32616
MILLER, W. H. N72-32173
MINDLIN, R. D. N72-32254
MINKO, L. Y. N72-32520
MISHCHENKO, Y. A. N72-32175
MITCHELL, D. K. N72-32452
MITCHELL, E. N. N72-32726
MITCHELL, R. C. N72-32745
MIZUTANI, H. N72-32794
MLAVSKY, A. I. N72-32718
MNEW, H. N72-32771
MOHAPATRA, R. N. N72-32674
MOHLING, R. A. N72-32296
MOHON, W., N. N72-32243
MOLIERE, G. N72-32681
MONNERIE, B. N72-32012
MOORE, J. G. N72-32439
MOORE, T. J. N72-32500
MORAIN, S. A. N72-32375
MORAN, D. D. N72-32265
MORIN, P. N72-32106
MORRIS, J. F. N72-32650
MORRISON, R. B. N72-32357
N72-32489
MORSE, F. N72-32253
MOTT-SMITH, J. C. N72-32191
MOURIQUAND, C. N72-32122
MOUZUGHI, S. G. N72-32077
MUELLER, F. N72-32219
MUENCH, R. D. N72-32380
MUNOZ, A. N72-32233
MURPHY, C. G. N72-32524
MURPHY, J. N72-32733
MUSIY, V. I. N72-32823
MUTH, E. J. N72-32508
MYASNIKOV, V. I. N72-32088

N

NADEZHIN, D. K. N72-32315
NAGAO, T. N72-32113
N72-32114
NAKANISHI, S. N72-32096
NAMIAS, J. N72-32436
NAMITOKOV, K. K. N72-32538
N72-32665
NARAYANASWAMI, R. N72-32901
NEGRESKUL, V. V. N72-32075
NELLES, W. N72-32146
NELSON, D. R. N72-32977
NELSON, H. K. N72-32358
NEMCHINOV, S. V. N72-32636
NEPOMUCENO, L. X. N72-32456
N72-32494
N72-32543
N72-32544
N72-32545
N72-32546
NESS, N. F. N72-32464
N72-32810
N72-32850
NEUBAUER, F. M. N72-32464
N72-32654
NEUMANN, R. D. N72-32001
NEVITT, J. S. N72-32048
NEXSEN, W. E., JR. N72-32706
NEYA, K. N72-32287
NICKELL, R. E. N72-32236
N72-32914
NICKLES, J. N72-32673
NICOL, W. S. N72-32721
NIEBERDING, W. C. N72-32458
NIVEN, J. I. N72-32061
NOBLE, L. N72-32532
NORDBERG, W. N72-32417
NORMAN, R. N72-32232
NOSSAMAN, R. O. N72-32120
N72-32649
NOVELLO, J. N72-32173
NOVIKOV, S. S. N72-32841
NUMA, S. N72-32096
NUSBAUM, W. J. N72-32072

O

ODEGARD, B. C. N72-32554
ODENWALDER, J. P. N72-32206
OELKERS, W. N72-32118
OGLAND, J. W. N72-32237
OHANLON, J. F. N72-32125
OHRING, S. N72-32331
OKHOTSIMSKIY, D. Y. N72-32499
OLIVEIRA, N. F. N72-32722
OLIVER, B. M. N72-32827
OLNESS, R. N72-32159
OLSEN, R. O. N72-32437
OLTARZEWSKI, H. N72-32055
OMIDVAR, K. N72-32682
ON, F. J. N72-32886
ONEDA, S. N72-32671
ORLOV, N. N72-32246
ORLOV, V. M. N72-32466
ORMES, J. F. N72-32463
OTTZEN, P. C. N72-32221
OUSH, P. T. N72-32075
OVCHINNIKOV, A. A. N72-32841
OZAWA, J. N72-32113
N72-32114

P

PADUR, J. P. N72-32793
PAGE, C. H. N72-32968
PALACOL, E. L. N72-32918
PALLADII, A. V. N72-32770
PANKHURST, R. C. N72-31994
N72-32749
PANOV, Y. A. N72-32305
PAPPERT, R. A. N72-32197
PAPSHEV, D. D. N72-32506
PARKINSON, W. H. N72-32167
PARSONS, J. S. N72-32330
PATANKER, S. V. N72-32944
PATEL, J. S. N72-32881
PATET, J. N72-32122
PATRICK, J. W. N72-32799
PATTERSON, M. R. N72-32678
PAULK, R. A. N72-32484
PAULSON, R. W. N72-32359
PAVLICHENKO, O. S. N72-32708
PEARCE, J. A. N72-32737
PECK, J. C. N72-32918
PELTON, J. M. N72-32484
N72-32769
PENA, R. N72-32627
PEPPER, S. V. N72-32571
PERELMAN, R. G. N72-32298
N72-32307
N72-32308
PERKINS, C. W. N72-32574
PERMINOV, V. P. N72-32551
PERMYAKOV, V. G. N72-32560
PERRY, A. E. N72-32311
PETERMANN, K. N72-32224
PETERSON, G. R. N72-32490
PETERSON, R. V. N72-32480
PETROV, L. A. N72-32477
PETROVA, L. V. N72-32720
PETRUNIN, V. I. N72-32481
PETVUSHIN, Y. N. N72-32070
PFENDLER, D. L. N72-32245
PHILIPP, U. N72-32092
PHILLIPS, D. G. N72-32761
PIAN, T. H. H. N72-32067
PIANKO, M. N72-32042
PIKOVSKII, A. M. N72-32506
PILONERO, J. T. N72-32340
PIOTROWSKA, Z. N72-32686
PITTS, J. R. N72-32473
PIVA, R. N72-32933
PLACE, J. L. N72-32361
PLATNOV, A. K. N72-32499
PLUHOWSKI, E. J. N72-32362
PLUNSER, A. N72-32235
POCH, R. N72-32933
POCHTMAN, Y. M. N72-32904
PODSTRIGACH, Y. S. N72-32922
POEPPEL, E. N72-32093
POKRZYWNICKI, J. N72-32809
POLEZHAEV, A. P. N72-32428
POOL, D. J. N72-32036
POOLER, W. S. N72-32954
POPOV, D. S. N72-32563
POPOV, Y. V. N72-32734
POROS, D. J. N72-32419
PORTNYAGIN, Y. I. N72-32837
POSEN, H. N72-32730
POSPELOV, G. A. N72-32770
POTOPOV, A. A. N72-32647
POTTS, J. E. N72-32743
N72-32767
POTTS, J. S. N72-32244
POUR, J. J., SR. N72-32473
POVITSKIY, A. S. N72-32102
POWELL, F. D. N72-32260
POWER, J. L. N72-32155
PRABHAKARA, C. N72-32417
N72-32418
PRESS, J. N72-32258
PRIES, T. H. N72-32527
N72-32632
PRUETT, E. D. R. N72-32085
PUCCINELLI, E. F. N72-32898

Q

QUADE, E. S. N72-32976

R

RABE, D. C. N72-32326
RABEAU, M. N72-32523
RABINOVICH, B. A. N72-32102
RABINOWITZ, P. H. N72-32329
RADECKI, D. J. N72-32515
RAGSDALE, W. O. N72-32132
RAMASASTRY, J. N72-32263
RANEY, J. P. N72-32868
RANGER, A. A. N72-32269
REBSCH, H. N72-32505
REED, L. N72-32532
REED, T. N72-32722
REES, D. N72-32611
REEVES, C. C. N72-32173
REEVES, E. M. N72-32167
REID, D. B. N72-32257
REIMERS, G. W. N72-32659
REIMNITZ, E. N72-32335
REMINGTON, D. A. N72-32077
REPNEV, A. I. N72-32416
REYBROUCK, G. N72-32087
REYNOLDS, J. E. N72-32242
REYNOLDS, R. S. N72-32515
REYNOLDS, T. W. N72-32764
RHOADES, T. S. N72-32646
RHOADS, D. J. N72-32050
RICH, E. I. N72-32338
RICHARDS, D. W. N72-32792
RICHTER, K. R. N72-32185
RICHTER, T. J. N72-32626
RIDDER, S. N72-32011
RIDER, L. J. N72-32627
RIVIR, R. B. N72-32326
ROBERTS, E., JR. N72-32212
ROBINSON, J. C. N72-32873
RODAHL, K. N72-32085
RODGERS, C. N72-32771
RODIONOV, V. V. N72-32841
ROE, P. L. N72-31995
N72-31996
N72-31997
N72-31998
N72-31999
N72-32000
ROESSLER, M. N72-32828
ROGERS, E. H. N72-32460
ROGERS, F. N72-32159
ROGERS, J. G. N72-32846
ROGERS, J. L., JR. N72-32887

ROHRBACH, R. N72-32105
ROL, P. K. N72-32633
ROMANOV, G. S. N72-32520
N72-32540
ROOSE, U. J. N72-32213
ROPE, E. L. N72-32526
ROSENBAUM, B. N72-32263
ROSENBAUM, S. N72-32189
ROSENBERGER, P. B. N72-32134
ROSS, M. N72-32159
ROSS, R. G., JR. N72-32070
ROSS, S. N72-32263
ROTH, J. R. N72-32695
ROTH, L. J. N72-32069
ROTH, W. N72-32905
ROTHMAN, H. N72-32302
ROTSTRIGACH, Y. S. N72-32948
ROVNYKH, A. V. N72-32005
ROWAN, L. C. N72-32363
ROY, R. N72-32805
ROZHDESTVENSKII, B. L. N72-32322
RUDEY, R. A. N72-32754
RUEMPLER, R. N72-32105
RUMBARGER, J. H. N72-32507
RUNGE, J. N72-32146
N72-32147
RUSSELL, O. R. N72-32336
RUST, T., JR. N72-32937
RUSYANOV, Y. G. N72-32427
RUTENFRANZ, J. N72-32099
RYAN, M. J. N72-32463
RYZHEVSKII, A. G. N72-32465

S

SAARI, D. P. N72-32063
SABANEYEV, P. F. N72-32820
SABELMAN, E. E. N72-32498
SABIN, R. C. N72-32638
SABOT, J. N72-32314
SAIN, I. N72-32394
SAKAI, F. N72-32154
SAKURAI, K. N72-32779
SALATHE, R. E. N72-32078
SALEEM, M. N72-32076
SALINGER, S. S. N72-32490
SAMSONOV, G. V. N72-32551
SAMSONYUK, I. M. N72-32560
SANDRI, G. N72-32786
SANFORD, T. E. N72-32613
SARI, J. W. N72-32782
SARRIS, A. H. N72-32639
SATO, S. N72-32287
SAVCHENKO, M. A. N72-32414
SAVIN, B. M. N72-32084
SAVINO, J. M. N72-32443
SAWOROTNOW, I. N72-32282
SCHAEFER, V. J. N72-32609
SCHAFFT, H. A. N72-32225
SCHATTEN, K. H. N72-32464
N72-32654
SCHIRRA, M. N72-32552
SCHLEUSENER, S. A. N72-32530
SCHMID, P. E. N72-32608
SCHMIDT, W. W. N72-32766
SCHMITZ, G. N72-32693
SCHNEIDER, W. N72-32698
SCHOFIELD, W. H. N72-32311
SCHOLZ, N. N72-32313
SCHOUTEN, J. N72-32116
SCHRADE, H. O. N72-32712
SCHREUDER, J. T. R. N72-32116
SCHROEDER, W. N72-32410
N72-32412
SCHROEDL, M. A. N72-32915
SCHROERS, L. G. N72-32021
SCHROETTER, H. N72-32136
SCHUETZ, J. N72-32097
SCHULZE, R. N72-32471
SCHWARTZMAN, V. F. N72-32826
SCHWERZLER, D. D. N72-32876
SCOTT, A. F. D. N72-32611
SCOTT, W. J. N72-32193
SCOUTT, J., JR. N72-32983
SEDER, G. N72-32581
SEEMANN, R. J. N72-32282
SELLMANN, P. W. N72-32429
SELTZER, S. M. N72-32881
SEMERJIAN, H. N72-32328
SEMIKOZ, V. B. N72-32696
SENGERS, J. V. N72-32938
SERRA, J. D. N72-32981
SEVASTIANOV, V. I. N72-32466
N72-32978
SEVERIN, G. I. N72-32102
SHABLYI, O. N. N72-32906
SHANMUGAM, K. N72-32203
N72-32453
SHANSKII, V. F. N72-32699
SHAPIRA, Y. N72-32722
SHARINOVA, S. M. N72-32636
SHARMA, G. D. N72-32381
SHARONOV, V. V. N72-32822
SHARP, D. L. N72-32215
SHCHEGLOV, P. W. N72-32841
SHCHENNIKOV, V. V. N72-32306
SHEPPARD, J. C. N72-32123
SHESTAKA, I. S. N72-32823
SHESTATSKII, S. N72-32734
SHIDLOVSKII, A. Y. N72-32596
SHIELDS, S. N72-32119
SHILIN, B. V. N72-32406
SHIMOJI, E. N72-32113
N72-32114
SHOWEN, R. L. N72-32446
SHOWN, L. M. N72-32364
SHTARKOV, Y. M. N72-32209
SHUTOV, S. D. N72-32734
SHVIDLOVSKY, E. N72-32416
SIEGL, M. N72-32077
SIEWERT, R. F. N72-32037
SIGAL, V. L. N72-32602
SIKULA, G. J. N72-32635
SILVERMAN, S. M. N72-32439
SIMON, D. R. N72-32168
SIMONEN, T. C. N72-32706
SINITEAN, D. N72-32660
SINITSYN, A. P. N72-32929
SINITSYN, E. N. N72-32928
SIPENLOV, I. E. N72-32511
SKALOZUBOV, M. F. N72-32079
SKATTUM, K. S. N72-32880
SKIPKA, K. J. N72-32527
SKOLIARKOV, A. A. N72-32465
SKRUPNIK, V. G. N72-32101
SKURATOVA, L. Y. N72-32090
SLAUGHTER, J. R. N72-32630
SLEETER, M. R. N72-32476
SLIFF, R. N72-32020
SLOAN, M. L. N72-32709
SMIRNOV, S. A. N72-32408
SMIRNOV, V. A. N72-32819
SMIRNOV, V. G. N72-32075
SMIRNOVA, Y. A. N72-32819
SMIROV, A. I. N72-32481
SMITH, C. W. N72-32915
SMITH, J. N72-32527
N72-32632
SMITH, R. C. N72-32121
SMITH, T. G. N72-32577
SMITH, W. L. N72-32780
SMITH, W. R. N72-32253
SMITHER, M. A. N72-32211
SMOKTII, O. I. N72-32466
SMOOTKATOW, M. N72-32892
SNOW, J. D. N72-32741
SOBOLEV, V. V. N72-32734
SOCHIVKO, V. P. N72-32124
SOFIOS, M. N72-32115
SOHN, S. J. N72-32177
N72-32179
N72-32181
SOKOLOV, A. A. N72-32676
N72-32677
SOKOLOVSKII, V. V. N72-32927
SOLANO, R. N72-32552
SOLOP, N. A. N72-32188
SOLOPIKHIN, D. P. N72-32538
SOLTES, A. S. N72-32200
SOMOGYI, A. J. N72-32788
SORENSEN, J. A. N72-32040
SOSNOVA, A. K. N72-32837
SOUTHWARD, H. D. N72-32728
SPALDING, D. B. N72-32944
SPEED, F. M. N72-32587
SPEKTOR, E. I. N72-32770
SPERBER, G. L. N72-32215
SPERLING, E. N72-32965
SPEZIA, E. N72-32061
SPIEGEL, H. J. N72-32240
SPIES, K. P. N72-32199
SPILLANE, K. T. N72-32404
SPREEUW, E. N72-32896
SPRINGER, C. E. N72-32729
SPRUIELL, J. E. N72-32556
SRB, I. N72-32736
ST. SAVIN, I. N72-32405
STANTON, E. L. N72-32889
STARGARDT, W. W. N72-32204
STARK, J. A. N72-32844
STARNES, J. H., JR. N72-32874
STAUBERT, R. N72-32213
STAUFFIS, R. N72-32502
STECHER, T. P. N72-32839
STEELE, W. C. N72-32165
N72-32953
N72-32525
STEIN, A. N72-32542
STEINBERG, R. N72-32795
STEINWACHS, W. L. N72-32799
N72-32802
N72-32803
STEPHAN, J. G. N72-32422
STEPHENS, J. R. N72-32549
STEPNER, R. K. N72-32065
STEVENS, A. J. N72-32220
STEVENSON, S. M. N72-32182
STEWART, L. D. N72-32687
STEWART, W. M. N72-32673
STICKLAND, A. C. N72-32959
STICKLER, D. C. N72-32960
STIRLING, W. L. N72-32236
STOECKELER, E. G. N72-32687
STOLLERY, J. L. N72-32341
STOLZ, P. R. N72-32004
STONE, E. C. N72-32057
STRAUSS, B. P. N72-32777
STRONE, R. J. N72-32716
STRUYS, T. J. N72-32168
SUCKEWER, S. N72-32517
SUDAREV, A. V. N72-32951
SUGIURA, M. N72-32321
SUKHOPAROV, S. A. N72-32419
SULLIVAN, R. D. N72-32656
SUMNER, N. R., JR. N72-31993
SUROVTSEV, I. Y. N72-32284
SUROWIAK, W. N72-32538
SUSHKOV, Y. N. N72-32583
SUSLOV, A. D. N72-32101
SUSLOV, O. N. N72-32942
SUSSMAN, S. M. N72-32306
SUTPHIN, H. D. N72-32248
SUTTON, G. H. N72-32479
SUZUKI, T. N72-32423
N72-32113
N72-32114
SWATEK, F. E. N72-32115
SYKES, L. R. N72-32443
SZUSZCZEWICZ, E. P. N72-32400
N72-32692

T

TABAK, R. G. N72-32579
TABAKOFF, W. N72-32774
TAEUSCH, D. R. N72-32813
TAKEUCHI, H. N72-32794
TAMILOV, V. S. N72-32301
TANIGUCHI, N. N72-32041
TANNEHILL, J. C. N72-32296
TARDOV, V. M. N72-32100
TARKPEA, P. N72-32158
TATARINOV, E. A. N72-32486
TAYLOR, R. E. N72-32184
N72-32559
TEPPER, S. N72-32900
TERASHIMA, K. N72-32496
TEREKHOV, Y. V. N72-32128
TERNOV, I. M. N72-32676
N72-32677
TETHER, A. J. N72-32064
THEON, J. S. N72-32417
THOMAS, C. N72-32105
THOMAS, H. N72-32835
THOMPSON, A. W. N72-32554
THOMPSON, D. H. N72-32309
THOMPSON, J. R. N72-32709
THOMPSON, O. O. N72-32281
THOMPSON, P. E. N72-32515
THORNTON, E. A. N72-32878
THORSTEINSEN, T. F. N72-32673
TIRSKIY, G. A. N72-32306
TISHCHENKO, M. I. N72-32128
TITOV, G. S. N72-32979
TODD, F. C. N72-32690
TOGNET, A. N72-32012
TONG, P. N72-32067
TOROPTSEV, I. V. N72-32126
TORVEN, S. N72-32697
TRICOLES, G. N72-32526
TRIGG, D. N72-32332
TRUE, D. M. N72-32802
TRUEMPER, J. N72-32213
TRUMBOWER, G. C. N72-32433
TSE, E. T. S. N72-32064
TSYTOVICH, V. N. N72-32701
TULLY, J. A. N72-32680
TUREK, R. J. N72-32763
TURKEL, S. H. N72-32798
N72-32799
N72-32802
TURNER, R. M. N72-32365
TVERDOKHLEB, V. G. N72-32510
TYLER, J. S., JR. N72-32065
TYULENEV, G. G. N72-32514

U

ULABY, F. T. N72-32372
UNGURYANU, G. I. N72-32075
URSUL, A. D. N72-32978
USHANOV, A. I. N72-32107
UUEMYIS, K. K. N72-32488
UVAROV, V. B. N72-32592

V

VADASZ, E. N72-32558
VALIDOV, M. A. N72-32653
VANDENHOVE, D. N72-32110
VANDERHOVEN, I. N72-32610
VANDEVOORDE, H. N72-32087

VANDIERENDONCK, A. J. N72-32068
VANDUIN, R. H. A. N72-32393
VANFOFY, G. A. N72-32931
VANNIMWEGEN, R. R. N72-32900
VANREGEMORTER, H. N72-32680
VANTRIES, B. J. N72-32366
VARWIG, R. L. N72-32531
VASILEV, O. B. N72-32466
VASKO, A. N72-32736
VAUGHN, J. C., III N72-32056
VENEDIKTOV, A. B. N72-32128
VERESHCHAGIN, V. G. N72-32653
VERSSEN, J. A. N72-32048
VIGOUREUX, P. N72-32968
VILLU, A. N72-32284
VINOGRADOV, B. V. N72-32466
VISHKAREV, A. F. N72-32563
VITERBI, A. J. N72-32206
VLADIMIROV, V. V. N72-32699
VODOPYANOV, N. G. N72-32186
VOGGEL, K. N72-32111
VOLOSHIN, G. Y. N72-32640
VOLPE, J. N72-32969
VONBECKH, H. J. N72-32131
VONMULDAU, H. N72-32493
VOYTENKO, A. M. N72-32305
VYATSKIN, Y. B. N72-32450
VYSOKOSOVSKII, S. N. N72-32514

W

WACHI, F. M. N72-32162
WACHSMAN, R. H. N72-32178
N72-32180
WAGNER, C. A. N72-32402
WAGNER, G. R. N72-32733
WAHL, G. N72-32148
WAIT, J. R. N72-32199
N72-32261
WALD, F. N72-32718
WALKER, H. E. N72-32515
WALPOLE, J. N. N72-32727
WALTON, A. K. N72-32721
WALZ, J. E. N72-32887
WANG, H. N72-32663
WANNER, J. N72-32018
N72-32035
WARD, W. G. N72-32890
WASICKO, R. J. N72-32038
WASSERBURG, G. J. N72-32830
WATANABE, T. N72-32694
WATERMAN, A. N72-32251
WATSON, G. K. N72-32549
WATTERSON, R. K. N72-32581
WAY, S. H. N72-32683
WEBER, F. P. N72-32337
WECHSLER, M. S. N72-32553
WEETON, J. W. N72-32541
WEIDMAN, D. J. N72-32868
WEIDMAN, R. M. N72-32388
WEIGERT, A. N72-32835
N72-32838
WEIR, J. R., JR. N72-32555
WELLER, G. E. N72-32384
WENTNK, T., JR. N72-32161
WERLE, H. N72-32303
WERNER, P. N72-32966
WESTBROOK, C. B. N72-32022
WHEELER, P. C. N72-32574
WHIDDEN, R. W. N72-32625
WHITE, D. N72-32448
WHITE, K. O. N72-32530
WHITESIDE, H. N72-32463
WHITNEY, W. J. N72-32762
WIEDERHOLD, P. R. N72-32793
WIER, C. N72-32336
WIGHT, R. B. N72-32872
WILEMON, D. L. N72-32954
WILKINS, P. E. N72-32129
WILKINSON, M. T. N72-32894
WILLBANKS, C. E. N72-32769
WILLIAMS, B. E. N72-32468
N72-32539
WILLIAMS, B. H. N72-32437
WILLIAMS, D. A. N72-32839
WILLIAMS, J. G. N72-32874
WILLIAMS, R. D. N72-32875
WILLIS, C. M. N72-32911
WILSON, J. W. N72-32679
WILSON, K. B. N72-32725
WISE, E. W. N72-32743
N72-32767
WITKOWSKI, S. N72-32518
WITTE, J. N72-32073
WOBBER, F. J. N72-32336
WOLFF, C. N72-32122
WOLL, A. M. N72-32367
WONG, H. V. N72-32709
WOOD, B. D. N72-32954
WOOD, R. N72-32502
WOODCOCK, R. F. N72-32537
WOOLLARD, G. P. N72-32423
WORKMAN, R. A. N72-32490
WORKS, G. A. N72-32200
WORZALA, F. J. N72-32716
WRIGHT, D. S. N72-32404
WRIGHT, F. F. N72-32381
WRIGHT, W. A. N72-32201
WUENNENBERG, H. N72-32024
WYKES, J. H. N72-32031
WYRTKI, K. N72-32423

Y

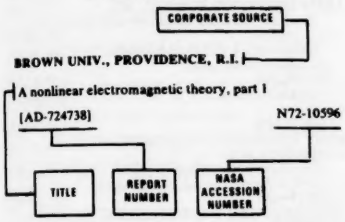
YABLOCHKIN, V. D. N72-32107
YABUKI, H. N72-32675
YAKOVLEV, D. G. N72-32702
YAKOVLEVA, I. Y. N72-32088
YAMANE, T. N72-32519
YANENKO, N. N. N72-32322
YANG, W. J. N72-32716
YANOFF, M. N72-32127
YARGER, H. L. N72-32373
YARIV, A. N72-32669
YAVOYSKII, V. I. N72-32563
YEH, F. C. N72-32949
YEL'YASHEVICH, M. A. N72-32520
YERMOLENKO, S. D. N72-32005
YEVSYUKOV, Y. P. N72-32107
YOSHIMURA, S. N72-32113
N72-32114
YUDIN, I. A. N72-32825

Z

ZAKHAROV, A. I. N72-32482
ZENEOMON, A. N72-32113
ZERKLE, H. G. N72-32457
ZHELEZNYAKOV, V. V. N72-32947
ZIRPOLO, G. N72-32112
ZIV, M. N72-32910
ZUBKOV, A. I. N72-32305
ZUYEV, V. S. N72-32757
N72-32758
ZVORYKIN, V. N. N72-32084
ZWANZIG, M. N72-32118

CORPORATE SOURCE INDEX

TYPICAL CORPORATE SOURCE INDEX LISTING



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ACADEMY OF SCIENCES [USSR], MOSCOW.
Cosmic data. Monthly review no. 10, October 1971
N72-32396
Spectra of magnetic pulsations of nonisothermal plasma
[NP-19291] N72-32701

ACADEMY OF SCIENCES OF THE ARMENIAN SSR, EREVAN [USSR].
On the possibility of the charged-particle track drift compensation in the wide gap spark chamber
[EFI-ME-1[71]] N72-32684

ADDIS TRANSLATIONS INTERNATIONAL, WOODSIDE, CALIF.
Determining the sound field produced by the maneuvering of jet aircraft
[NASA-TT-F-14489] N72-32047
Drag and heat transfer coefficients of meteor bodies. 1: Conditions of weak shielding
[NASA-TT-F-14491] N72-32837

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, PARIS [FRANCE].
Aerodynamic problems of hypersonic vehicles, volume I
[AGARD-LS-42-VOL-1] N72-31994
Handling qualities criteria
[AGARD-CP-106] N72-32017
Flight recording in NATO countries, second edition
[AGARD-AR-39] N72-32457
Aerodynamic problems of hypersonic vehicles. Volume 2: Propulsion of hypersonic vehicles
[AGARD-LS-42-VOL-2] N72-32749

AEROJET SOLID PROPULSION CO., SACRAMENTO, CALIF.
Buckling analysis of a missile interstage
N72-32871

AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON, INC., N.J.
An invariant second-order closure model of the compressible turbulent boundary layer on a flat plate
[NASA-CR-128172] N72-31993
Photoionization measurement study
[NASA-CR-130064] N72-32786

AERONAUTICAL RESEARCH INST. OF SWEDEN, STOCKHOLM.
Dynamic stability measurement of a lifting body configuration at hypersonic speeds, part 4
[AU-648-PT-4] N72-32039

AERONAUTICAL RESEARCH LABS., MELBOURNE [AUSTRALIA].
A survey of water tunnel flow visualisation techniques
[ARL/A-NOTE-335] N72-32309
Demonstrating X ray diffraction
[ARL/MET-78] N72-32539

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT, BOSCOMBE DOWN [ENGLAND].
The nature and use of the rules for judging the acceptability of the flying qualities of fixed wing aircraft
N72-32019

AEROSPACE CORP., EL SEGUNDO, CALIF.
Heat of formation and entropy of C3 molecule
[AD-744046] N72-32162
Thin foil calorimeters for the measurement of energy deposition profiles and spatial fluence distributions of low energy pulsed electron beams
[AD-743838] N72-32480
Chemical laser nozzle flow diagnostics
[AD-743999] N72-32531

AEROSPACE CORP., SAN BERNARDINO, CALIF.
Thermal stress analysis of reentry vehicle nosetips at angle of attack
[AD-743897] N72-32859

AEROSPACE RESEARCH LABS., WRIGHT-PATTERSON AFB, OHIO.
Some design aspects of hypersonic vehicles
N72-32002
Spectral matching factors for photocathodes phosphor screens, and photographic emulsions in image intensifier recorders using night sky illumination, and related problems
[AD-744056] N72-32240
Ten place tables of the Jacobian elliptical functions. Part 4: Arguments at rational fractions of the quarter period
[AD-741781] N72-32594
The momentum equation to describe the dynamics of electric arcs
[AD-744520] N72-32712

AGNEW TECH-TRAN, WOODLAND HILLS, CALIF.
Possibility of using an atmosphere based on CO2 in a power plant
[NASA-TT-F-14505] N72-32074
Pyrolysis gas chromatography of amino acids and proteins
[NASA-TT-F-14483] N72-32151
Pyrolysis of cellulose
[NASA-TT-F-14503] N72-32154
Combinatorial coding for discrete stationary sources
[NASA-TT-F-14484] N72-32209
On the possible explanation of period breakdowns of pulsars by their gravitational radiation
[NASA-TT-F-14485] N72-32826

AIR FORCE AERO PROPULSION LAB., WRIGHT-PATTERSON AFB, OHIO.
Correlation of flow resistance and reflection coefficient for weak shock waves
[AD-744509] N72-32326

AIR FORCE CAMBRIDGE RESEARCH LABS., L. G. HANSCOM FIELD, MASS.
Computer aided evaluation of reconnaissance image compression schemes using an on-line interactive facility
[AD-743860] N72-32191
A FORTRAN program that derives air temperature, density, and composition as a function of height and exospheric temperature
[AD-744077] N72-32438
Optical effects of the March 1970 geophysical event at the AFCRL Geopole Observatory, Thule Air Base, Greenland
[AD-744074] N72-32439
Laser damage study with subnanosecond pulses
[AD-744075] N72-32534
Hailstone extremes for design
[AD-743831] N72-32624
Air droppable wire dispensers for atmospheric electricity studies
[AD-743863] N72-32625
Fundamental geokinetic considerations in multiple position gyrocompassing
[AD-743832] N72-32646
Analysis of propagation in space-time modulated media using many-space scale perturbation theory
[AD-743861] N72-32664
X ray topographic observations of slip distributions in alpha silicon carbide
[AD-744076] N72-32730
On the classification distribution, and interpretation of solar microwave burst spectra and related topics
[AD-741750] N72-32791
Solar mapping at the Haystack Observatory on the wavelength of 3.8 cm
[AD-742235] N72-32792

AIR FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON AFB, OHIO.
Special topics in hypersonic flow
N72-32001
Theoretical pilot rating predictions
N72-32036
Static and drop tests of a quarter scale model of the CC-115 aircraft equipped with an air cushion landing system
[AD-743829] N72-32056
A study of the effects of parameter variation on the flying qualities of the XV-4B V/STOL aircraft
[AD-744104] N72-32066
A technique for measuring in-plane displacements by holographic interferometry
[AD-744490] N72-32483
A study of the parameters associated with employing laser speckle correlation fringes to measure in-plane strain
[AD-744489] N72-32533

AIR FORCE FLIGHT TEST CENTER, EDWARDS AFB, CALIF.
Criteria trends obtained from analysis of current aircraft
N72-32025

AIR FORCE HUMAN RESOURCES LAB., WILLIAMS AFB, ARIZ.
Using a ground trainer in a job sample approach to predicting pilot performance
[AD-741747] N72-32142

AIR FORCE INST. OF TECH., WRIGHT-PATTERSON AFB, OHIO.
Microwave ILS scanning beam data rate analysis applied to the CH-53A helicopter
[AD-743612] N72-32057
A digital simulation of psychological correlates of a model of the human visual system
[AD-742431] N72-32132
Atmospheric contrast transmission: Application to the visual detection and electro-optical lock-on problem
[AD-743560] N72-32192
Sidelight spectroscopy of a carbon dioxide laser amplifier
[AD-743567] N72-32528
Photoluminescence studies of germanium using a neodymium laser
[AD-743566] N72-32529
Zero-phonon line absorption spectra of radiation damage centers in silicon
[AD-743987] N72-32725

AIR FORCE MATERIALS LAB., WRIGHT-PATTERSON AFB, OHIO.
The shear and thermal stress behavior of a super-refined mineral oil and a fluorosilicone
[AD-744106] N72-32582

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
The M mark
[AD-744159] N72-32051
Basic problems in producing laminated aircraft structures
[AD-742780] N72-32055
Development of methods and means for studying the accumulation of fatigue damage in aircraft structures
[AD-744280] N72-32062
High temperature impregnation of sintered metal bases of alkaline battery electrodes
[AD-744254] N72-32079
Function of the organ of equilibrium and motion sickness
[AD-742409] N72-32133
Specific heat of a substance near the critical point of heat and gas
[AD-744251] N72-32164
Ferrite diode shift register with data regeneration
[AD-744156] N72-32214
Plan and analysis of binary synchronous counting circuits
[AD-744269] N72-32219
Microelectronics in military technology
[AD-744173] N72-32246
Aerodynamics of a swirling flow in an annular channel
[AD-744157] N72-32321

Hypersonic flow around a thin three-dimensional body
[AD-744143] N72-32325
High voltage pulse generator
[AD-744154] N72-32481
An adiabatic calorimeter for contact calibration of heat flux sensors
[AD-744178] N72-32486
Investigations of friction and wear behavior of PM-metal-graphite systems
[AD-744141] N72-32505
Surface hardening of bearing steel
[AD-744256] N72-32506
Solution of problems from the theory of gas lubrication by the equivalent equation method
[AD-744264] N72-32509
Study of water lubricated friction bearings made of reinforced epoxy composition
[AD-744289] N72-32510
Asympotic solution of problems of gas lubrication of high speed bearings with injection
[AD-744293] N72-32511
Study of gas flow in the lubricant layer of a gas static bearing
[AD-744294] N72-32512
Abrasive wear
[AD-744182] N72-32513
Consideration of high-speed strain hardening of a metal during pressure shaping from specimen test data
[AD-744185] N72-32514
Investigation to establish the comparative wear resistance of various metals to metals with melted polyamide coatings
[AD-743825] N72-32558
Formation of nitrous austenite during diffusion saturation of steel KhA
[AD-744151] N72-32560
Temperature dependences of the viscosity of metals
[AD-744153] N72-32561
Viscosity properties of iron-carbon melts with nickel and tungsten additives
[AD-744263] N72-32563
Viscosity, density and surface energy of molten alloys of iron and silicon
[AD-744255] N72-32566
Heat resistant reinforced polymers and their applications
[AD-744190] N72-32583
Operational system of objective analysis of ground pressure and barometric tendencies for a densified network
[AD-744184] N72-32636
Effect of dry friction forces in the gyro gimbal joint of the motion of a free gyro
[AD-744150] N72-32647
Multiple-use subsonic waves
[AD-743828] N72-32663
Classification features of the forms of the appearance of electrical erosion
[AD-744155] N72-32665
The Fabry-Perot interferometer and some applications of it in spectroscopy
[AD-744174] N72-32666
Integral and beam emission from tungsten, caused by radiation of a ruby laser
[AD-744285] N72-32667
Excitation of electromagnetic waves in a plasma where electrons have a directional velocity relative to the ions
[AD-744301] N72-32711
The spectrum of reflection of the chalcogenides of antimony and bismuth
[AD-744278] N72-32734
Chalcogenide glass semiconductors, 2
[AD-744249] N72-32736
Test stand for study of oscillations of turbine rotors in bearings with gas hydrodynamic lubrication
[AD-744265] N72-32770
Theory and design of aircraft turbomachines
[AD-744183] N72-32773
AS USSR. Astronomy reports [selected articles]
[AD-744172] N72-32841
Application of variational calculus methods to the solution of problems of optimum heating of thin shells
[AD-744140] N72-32922
Experimental investigation of the stability of cylindrical shells in torsion
[AD-744148] N72-32923
An improved theory of anisotropic shells
[AD-744138] N72-32924
Question of relaxation oscillations of a system with dry friction
[AD-744261] N72-32925
Rigidity of elastic and visco-elastic cylindrical shells from a reinforced material
[AD-744252] N72-32928
Thermoelastic vibrations of a cylindrical shell
[AD-744253] N72-32929
Multiply-connected sandwich plates and shells
[AD-744177] N72-32931

AIR POLLUTION CONTROL DISTRICT, LOS ANGELES, CALIF.
Jet aircraft operations: A threat to the air environment
[PAPER-71-117] N72-32048

AIR WEATHER SERVICE, SCOTT AFB, ILL.
Notes on analysis and severe-storm forecasting procedures of the Air Force Global Weather Central
[AD-744042] N72-32616
Weather warnings [Pacific area]
[AD-741827] N72-32617

AIRESEARCH MFG. CO., TORRANCE, CALIF.
High pressure turbine blade stress analysis
N72-32900

AKADEMIYA NAUK URSR, KHARKOV.
Theory of electrostatic probes in a retarding potential method
[KHFTI-71-22] N72-32700

AKTIEBOLAGET ATOMENERGI, STUDSVIK [SWEDEN].
Electrochemical methods for continuous measurement of corrosion rates especially with high temperature equipment made of carbon steel, stainless steel 18/8, and Zircaloy-2
[STU-70-394/U-325] N72-32158

ALABAMA UNIV. RESEARCH INST., HUNTSVILLE.
Evaluation of human engineering design standard [MSFC-STD-267A] in the design of manned space vehicles
[NASA-CR-61393] N72-32846

ALABAMA UNIV., HUNTSVILLE.
Study of dense aluminum plasmas
[NASA-CR-123830] N72-32690

ALASKA UNIV., COLLEGE.
Coordination and establishment of centralized facilities and services for the University of Alaska ERTS survey of the Alaskan environment
[E72-10139] N72-32262
Feasibility study for locating archaeological village sites by satellite remote sensing techniques
[E72-10128] N72-32376
Glaciological and volcanological studies on the Wrangell Mountains, Alaska
[E72-10129] N72-32377
Evaluation of feasibility of mapping seismically active faults in Alaska
[E72-10130] N72-32378
ERTS-1 data as a teaching and research tool in the Department of Geology
[E72-10131] N72-32379
Circulation of Prince William Sound
[E72-10132] N72-32380
Sea, ice and surface water circulation, Alaskan Continental Shelf
[E72-10133] N72-32381
Application of ERTS-1 imagery to the study of caribou movements and winter dispersal in relation to prevailing snowcover
[E72-10134] N72-32382
Break-up characteristics of Chena River Basin
[E72-10135] N72-32383
Survey of the seasonal snow cover of Alaska
[E72-10136] N72-32384
Identification definition and mapping of terrestrial ecosystems in interior Alaska
[E72-10137] N72-32385
Identification of phenological stages and vegetative types for land use classification
[E72-10138] N72-32386

AMERICAN OPTICAL CO., SOUTHBRIDGE, MASS.
Neodymium laser glass improvement program
[AD-744225] N72-32537

AMERICAN SCIENCE AND ENGINEERING, INC., CAMBRIDGE, MASS.
Observations of galactic X-ray sources
[ASE-3066] N72-32784

AMPEX CORP., REDWOOD CITY, CALIF.
Thermal effects on the clearance and stiffness of foil journal bearings for a Brayton cycle turboalternator
[NASA-CR-2113] N72-32495

ARECIBO IONOSPHERIC OBSERVATORY, PUERTO RICO.
Ionospheric heating analysis. HF plasma line enhancements at Arecibo
[AD-744523] N72-32446

ARGONNE NATIONAL LAB., ILL.
Radiological Physics Division Annual Report, July 1970 - June 1971
[ANL-7860-PT-2] N72-32140

ARKANSAS UNIV., LITTLE ROCK.
A general purpose wideband optical spatial frequency spectrum analyzer
[NASA-CR-128175] N72-32454

ARMY AEROMEDICAL RESEARCH LAB., FORT RUCKER, ALA.
The neurological effects of INH
[AD-744808] N72-32119
Effect of isoniazid on performance 2
[AD-728823] N72-32120
Helicopter in-flight monitoring system
[AD-745118] N72-32476
Improving US Army aircraft propeller and tail rotor blade conspicuity with paint
[AD-744453] N72-32579
Differential velocity and time prediction of motion
[AD-745119] N72-32649

ARMY AIR MOBILITY RESEARCH AND DEVELOPMENT LAB., FORT EUSTIS, VA.
A comparison of the capabilities of three finite element programs
N72-32884

ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
Terrain and coastal conditions on the Arctic Alaskan coastal plain. Arctic environmental data package, supplement 1
[AD-741354] N72-32429

ARMY EDGEWOOD ARSENAL, MD.
Chemical ionization ion cluster mass spectrometry
[AD-743453] N72-32163
Modifications and characterization of a low speed open-circuit wind tunnel
[AD-743454] N72-32285
Infrared absorptivity of ice Ih and its atmospheric emission
[AD-743445] N72-32631

ARMY ELECTRONICS COMMAND, FORT MONMOUTH, N.J.
Experimental investigation of high frequency antenna arrays having reduced ground losses
[AD-744469] N72-32247

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Application of module theory to design and evaluation of airfield pavement
[AD-741368] N72-32281

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, CHARLOTTESVILLE, VA.
Essays on marine bionics
[AD-742638] N72-32124
Morphological characteristics of the biological action produced by magnetic fields
[AD-742513] N72-32126
Low power electric motors
[AD-744510] N72-32252
Systems of quasilinear equations and their applications to gas dynamics
[AD-743579] N72-32322
Unstable internal waves in a viscous fluid
[AD-744512] N72-32327
Reduction of gravimetric measurements on the basis of numerical solution of Molodenskii's integral equation
[AD-741861] N72-32427
Methodical instructions for the course principles of space geodesy
[AD-741860] N72-32428
New theodolites and telescopic range finders
[AD-744511] N72-32482
Solution of one problem in nonlinear programming
[AD-743569] N72-32596
The study of plasma by lasers
[AD-742639] N72-32708
Strength and plasticity
[AD-744495] N72-32927

ARMY TEST AND EVALUATION COMMAND, ABERDEEN PROVING GROUND, MD.
Mat sets, landing
[AD-741857] N72-32278

ARO, INC., ARNOLD AIR FORCE STATION, TENN.
The development of a temperature measuring probe for use in a two-phase [gas-liquid] environment
[AD-744513] N72-32484
Measurement of pollutant emissions from an afterburning turbojet engine at ground level. Part 1: Particulate emissions
[AD-744048] N72-32768
A kinetic model for two phase flow in high temperature exhaust gas coolers
[AD-744514] N72-32769

ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N.MEX.
Stratospheric-ionospheric interaction during the movement of a planetary wave in January 1967
[AD-744470] N72-32437
Optical filter function for a folded laser path
[AD-743850] N72-32527
The 03702 Honest John, Missile No. 1624, Round No. 623 AML
[AD-743841] N72-32620
White Sands Missile Range climate calendar
[AD-743842] N72-32621
The 12808 Lance, missile no. 2146, round no. 157 SPL [20 April 1972]
[AD-743843] N72-32622
The 11602 Lance, missile no. 2131, round no. 156 EST [27 March 1972]
[AD-743844] N72-32623
Rawin radar target
[AD-743457] N72-32626
Turbulence characteristics at heights of 1.5, 4.0 and 16.0 meters at White Sands Missile Range, New Mexico
[AD-743456] N72-32627
Some observations of meteorological effects on optical wave propagation
[AD-744472] N72-32632

ATMOSPHERIC SCIENCES OFFICE, WHITE SANDS MISSILE RANGE, N.MEX.
Application of dual parameter analyzers in solid-state laser tests
[AD-743459] N72-32530
ATOMIC ENERGY CENTRE, LAHORE (PAKISTAN).
Rechargable batteries: A select bibliography
[AECL-PAK/LIB-34] N72-32076
AUSTIN RESEARCH ASSOCIATES, INC., TEX.
Turbulent heating of plasma by streaming instabilities
[AD-744230] N72-32709
AUSTRALIAN ATOMIC ENERGY COMMISSION, COOGEE.
In vitro study of the effect of gamma rays on human chromosomes
[LIB/TRANS-366] N72-32122
AUSTRALIAN POST OFFICE RESEARCH LABS., MELBOURNE.
Power supply transient response tester
[REPT-6655] N72-32220
AVCO CORP., LOWELL, MASS.
Exploratory development to study graphite vaporization kenetics and thermodynamics using the modulated beam mass spectrometer
[AD-744494] N72-32165
Exploratory development to study graphite vaporization kinetics and thermodynamics using the modulated beam mass spectrometer
[AD-744493] N72-32953

B

BATELLE COLUMBUS LABS., OHIO.
Amchitka bioenvironmental program. Application of photogrammetric techniques for environmental surveillance of Amchitka Island, Alaska
[BMI-171-135] N72-32422
BATTELLE-NORTHWEST, RICHLAND, WASH.
In-phantom dosimetry of prototypic plutonium circulatory support heat sources
[BNWL-SA-4121] N72-32123
Completely implantable three channel temperature biotelemetry system
[BNWL-SA-4231] N72-32141
Electronic interference reduction in acoustic emission testing
[BNWL-1596] N72-32259
BELL AEROSPACE CO., BUFFALO, N.Y.
Adaptive modeling and control
[AD-744344] N72-32260
Nondestructive test of regenerative chambers
[NASA-CR-120980] N72-32502
BENDIX CORP., SIDNEY, N.Y.
Reliable integrated wire termination devices
[AD-744476] N72-32245
BETTIS ATOMIC POWER LAB., PITTSBURGH, PA.
Effect of erosion and deposition on sampling of entrained particles
[WAPD-TM-1014] N72-32421
BOEING CO., HUNTSVILLE, ALA.
Borescope with variable angle scope
[NASA-CASE-MFS-15162] N72-32452
BOEING CO., PHILADELPHIA, PA.
Helicopter development reliability test requirements. Volume 2: Study parameters interrelationship
[AD-741377] N72-32053
Helicopter development reliability test requirements. Volume 3: Sensitivity analysis
[AD-742247] N72-32054
BOEING CO., SEATTLE, WASH.
Handling qualities criteria for supersonic transport
N72-32027
Evaluation of plasma cleaning and electron spectroscopy for reduction of organic contamination
[NASA-CR-128302] N72-32117
A tetra core stress analysis model
[AD-744505] N72-32580
Nonlinear phenomena in semiconductors through multiphoton absorption
[AD-744131] N72-32731
BRITISH BROADCASTING CORP., KINGSWOOD (ENGLAND).
Loudspeaker distortion associated with low-frequency signals
[BBC-1972/25] N72-32170
Digital line-store standards conversion: Preliminary interpolation study
[BBC-1972/28] N72-32171
BROWN UNIV., PROVIDENCE, R.I.
Analysis of structural-acoustic interactions in metal ceramic transducers
[AD-743985] N72-32236
A survey of direct integration methods in structural dynamics
[AD-743984] N72-32914
A numerical thermo-mechanical model for the welding and subsequent loading of a fabricated structure
[AD-744212] N72-32930
BRUNSWICK CORP., LINCOLN, NEBR.
Filament-wound graphite/epoxy rocket motor case
[NASA-CR-128417] N72-32766
BUREAU OF INDIAN AFFAIRS, WASHINGTON, D.C.
Timber resource information system
[E72-10116] N72-32367
BUREAU OF LAND MANAGEMENT, RIVERSIDE, CALIF.
Predict ephemeral and perennial range quantity and quality during normal grazing season
[E72-10090] N72-32343
BUREAU OF METEOROLOGY, MELBOURNE [AUSTRALIA].
Ocean waves at Port Phillip Heads
N72-32403
Deep water waves and swell state in Bass Strait
N72-32404
Winds and waves in Bass Strait
N72-32606
BUREAU OF MINES, DENVER, COLO.
A solid state amplifier for the bridge circuit of a mercury detector
[RI-7676] N72-32227
BUREAU OF MINES, MINNEAPOLIS, MINN.
Preparing magnetic fluids by a peptizing method
[BM-TPR-59] N72-32659
BUREAU OF RECLAMATION, DENVER, COLO.
Application of remote sensing to selected Bureau of Reclamation projects
[E72-10091] N72-32344
BUREAU OF SPORT FISHERIES AND WILDLIFE, JAMESTOWN, N.D.
Appraising changes in continental migratory bird habitat
[E72-10106] N72-32358
BUREAU OF SPORT FISHERIES AND WILDLIFE, WASHINGTON, D.C.
An evaluation of space acquired data as a tool for management of wildlife habitat in the state of Alaska
[E72-10115] N72-32366

C

CALIFORNIA INST. OF TECH., PASADENA.
Interaction of radiation and matter
[AD-744500] N72-32669
Transport of solar flare protons: Comparison of a new analytic model with spacecraft measurements
[NASA-CR-128295] N72-32777
Accretion process of the moon
[NASA-CR-125693] N72-32794
The composition and origin of the moon
[NASA-CR-128194] N72-32806
On the uniqueness of singular solutions to boundary-initial value problems in linear elastodynamics
[AD-744346] N72-32926
CALIFORNIA UNIV., BERKELEY.
Longer term consequences of the Short Take-Off and Landing [STOL] aircraft system
[NASA-CR-128197] N72-32016
Planetary X ray experiment
[NASA-CR-12850] N72-32455
Supergranulation and 5-minute oscillations in solar atmosphere
[AD-740233] N72-32789
CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Laboratory chemical kinetics as an atmospheric science
[LBL-497] N72-32160
CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Correlation of theory and experiment for high pressure hydrogen
[UCRL-73846] N72-32159
Accelerometers for the Misty North event
[UCRL-73654] N72-32478
Initial operation of the 2XII experiment
[UCRL-51208] N72-32706
CALIFORNIA UNIV., LOS ANGELES.
Embrittlement by liquid metals
[AD-744531] N72-32568
CALIFORNIA UNIV., SAN DIEGO.
Electrophysiological studies of the nervous system
[NASA-CR-128249] N72-32081
CANADAIR, LTD., MONTREAL [QUEBEC].
Application of V/STOL handling qualities criteria to the CL-84 aircraft
N72-32023
CARLETON UNIV., OTTAWA [ONTARIO].
Intercity passenger transport: A system design optimization model
[TR-72-1] N72-32972
CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Improved refractory oxides for structural applications. Part 1: Slip systems in aluminum oxide Al2O3. PArt 2: On the yield point in sapphire
[AD-743980] N72-32741
CENTRAL RESEARCH INST. FOR PHYSICS, BUDAPEST [HUNGARY].
Transient modulation
[KFKI-71-79] N72-32788
CERAMIC FINISHING CO., STATE COLLEGE, PA.
Strengthening oxides by reduction of crystal anisotropy
[AD-744047] N72-32576
CHICAGO UNIV., ILL.
Electronic structure and transport properties of amorphous semiconductors
[AD-744525] N72-32739
CHU ASSOCIATES, LITTLETON, MASS.
Spherical reflector transverse feed system
[AD-744064] N72-32238
CINCINNATI UNIV., OHIO.
An analytical study of flow losses through a two dimensional turbine cascade with boundary layer injection
[AD-744535] N72-32774
CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
Sonic booms and sleep: Affect change as a function of age
[FAA-AM-72-24] N72-32121
COAST GUARD, WASHINGTON, D.C.
Iceberg classification using Side Looking Airborne Radar
[AD-742653] N72-32425
Calibration and maintenance experience with an oceanographic and meteorological data acquisition system for large navigation buoys
[AD-742659] N72-32426
COLORADO SCHOOL OF MINES, GOLDEN.
Workshop: Determination of the minimum conductivity of the earth's crust
[AD-743867] N72-32432
COLORADO STATE UNIV., FORT COLLINS.
Rare-gas effects on metabolism and inert gas narcosis
[NASA-CR-128213] N72-32083
Very short range local area weather forecasting satellites
[AD-744098] N72-32635
COLORADO UNIV., BOULDER.
Synthesis of high speed homopolar alternators and theory of solid rotor electrical machines, part 5, phase DD
[AD-743591] N72-32077
COLUMBIA UNIV., NEW YORK.
Electromagnetic radiation from a vibrating quartz plate
[AD-744312] N72-32254
COMMISSARIAT A L'ENERGIE ATOMIQUE, FONTENAY-AUX-ROSES [FRANCE].
Wave conversion in an inhomogeneous plasma
[EUR-CEA-FC-627] N72-32703
COMMISSARIAT A L'ENERGIE ATOMIQUE, GRENOBLE [FRANCE].
Study and development of magnetic recording heads: A thin film integrated magnetic head
[CEA-R-4164] N72-32187
COMMISSARIAT A L'ENERGIE ATOMIQUE, LIMEIL-BREVANNES [FRANCE].
Pulsed neutron source using a laser beam
[CEA-R-4273] N72-32523
COMMISSARIAT A L'ENERGIE ATOMIQUE, SACLAY [FRANCE].
Fast identification algorithm and its application to the characterization of bipolar transistors
[CEA-CONF-1944] N72-32233
Analytical representation of time correlation functions and application to relaxation problems
[CEA-R-3597] N72-32593
COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES [U. S. SENATE].
Space agreements with the Soviet Union
N72-32961
COMMITTEE ON ARMED SERVICES [U. S. SENATE].
Fiscal year 1973 authorization for military procurement, research and development, construction authorization for the Safeguard ABM, and active duty and selected reserve strengths. Addendum 1: Amended military authorization request related to strategic arms limitation agreement
N72-32963
COMMITTEE ON SCIENCE AND ASTRONAUTICS [U. S. HOUSE].
Real estate disposal, NASA
N72-32964
For the benefit of all mankind
[H-REPT-92-1452] N72-32967
COMMITTEE ON SPACE RESEARCH [COSPAR], PARIS [FRANCE].
COSPAR information bulletin no. 62
N72-32959
COSPAR information bulletin no. 61
N72-32960
COMMUNICATIONS RESEARCH CENTRE, OTTAWA [ONTARIO].
A study of low-noise wide dynamic range radio frequency front end amplifiers
[CRC-1220] N72-32176
COMPUTER SCIENCES CORP., EL SEGUNDO, CALIF.
Modifications and additions to NASTRAN at Marshall Space Flight Center, 1969 - 1972
N72-32890

Structural dynamic and thermal stress analysis of nuclear reactor vessel support system
N72-32899
COMSTOCK AND WESCOTT, INC., CAMBRIDGE, MASS.
Instrumentation for studies of solar xuv radiation
[AD-743835] N72-32793
CONNECTICUT UNIV., STORRS.
Lattice thermal conductivity of a deformed copper-germanium alloy
[AD-744127] N72-32738
CONTROL DATA CORP., MINNEAPOLIS, MINN.
Structural analysis for a 40-story building
N72-32895
CORNELL AERONAUTICAL LAB., INC., BUFFALO, N.Y.
US military V/STOL handling quality requirements
N72-32022
The role of pilot rating in the development of handling criteria
N72-32028
CORPORATION FOR INFORMATION SYSTEMS RESEARCH AND DEVELOPMENT [CIRAD], CLAREMONT, CALIF.
Space programming language machine architecture study, volume 1
[AD-743014] N72-32216
Space programming language machine architecture study. Volume 2: Appendices
[AD-743015] N72-32217
CURTISS-WRIGHT CORP., WOOD-RIDGE, N.J.
Improved manufacturing method for processes for super finished spur and helical gears
[AD-742655] N72-32503

D

DAYTON UNIV. RESEARCH INST., OHIO.
Runway distribution study, European countries
[AD-742096] N72-32279
Runway distribution study, selected countries
[AD-742093] N72-32280
Interrelated structure of high altitude atmospheric profiles
[NASA-CR-61398] N72-32415
Computer programs for single stage axial compressor test data analysis. Volume 2: Program listings and sample calculations
[AD-744503] N72-32756
DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON [ENGLAND].
Target conductance and Vidicon resolution
[AD-740637] N72-32188
Analysis of the conditions of operation of gas turbine rotor bearing from the results of computer calculations of their thermal regimes
[AD-744297] N72-32772
DEFENSE DOCUMENTATION CENTER, ALEXANDRIA, VA.
Seals
[AD-744050] N72-32504
DELAWARE UNIV., NEWARK.
Applicability of ERTS-1 satellite imagery to the study of coastal processes
[E72-10119] N72-32369
Identification of coastal vegetation species in ERTS-1 imagery
[E72-10120] N72-32370
Application of ecological, geological and oceanographic ERTS-1 imagery to Delaware's coastal resources planning
[E72-10142] N72-32389
DENVER UNIV., COLO.
Program for the exploitation of unused NASA patents
[NASA-CR-128294] N72-32957
DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA [ONTARIO].
An amplifier and filter system for telluric signals
N72-32332
Resource satellites and remote airborne sensing for Canada. Report no. 4: Cartography and photogrammetry
[M75-2/4] N72-32448
DEPARTMENT OF SUPPLY, MELBOURNE [AUSTRALIA].
The turbulent boundary layer as a wall confined wake
[ARL/ME-134] N72-32311
A variable movement speciment holder for texture studies
[ARL/MET-81] N72-32468
The application of a helium-neon laser to the measurement of surface displacement, surface vibration, and random surface motion
[ARL/INST-76] N72-32517
Fatigue testing: Objectives, philosophies and procedures
[ARL/SM-336] N72-32907
DEPARTMENT OF TRANSPORTATION, WASHINGTON, D.C.
National transportation statistics
N72-32966
A statement on national transportation policy
N72-32969
The 1972 national transportation report: Present status, future alternatives
N72-32982
The implementation of the statement on national transportation policy
[AR-1] N72-32985
DEPUTY ASSISTANT SECRETARY OF DEFENSE [ENVIRONMENTAL QUALITY], WASHINGTON, D.C.
Department of Defense Environmental Quality Program
[AD-742107] N72-32442
DEUTSCHER WETTERDIENST, HOHENPEISSENBERG [WEST GERMANY].
Results of aerological ozone soundings at the Hohenpeissenberg Meteorological Observatory
[AD-741882] N72-32612
DIKEWOOD CORP., ALBUQUERQUE, N.MEX.
Polar cap bibliography with abstracts. 1: The polar cap ionosphere
[AD-743952] N72-32424
Polar cap bibliography
[AD-744090] N72-32440

E

EARTH SATELLITE CORP., WASHINGTON, D.C.
Study of application of ERTS-1 imagery to fracture-related mine safety hazards in the coal mining industry
[E72-10064] N72-32336
ENGINEERING SCIENCES DATA UNIT, LONDON [ENGLAND].
Aero-normalised stability derivatives: Effect of wing on yawing moment due to yawing
[ESDU-71017] N72-31988
A method for estimating the pressure distribution on the surface of a two-dimensional aerofoil in a sonic stream
[ESDU-69013] N72-31989
Lift-curve slope and aerodynamic centre position of wings in inviscid supersonic flow
[ESDU-70012] N72-31990
Lift-curve slope and aerodynamic centre position of wings in inviscid subsonic flow
[ESDU-70011] N72-31991
Aero-normalised stability derivatives: Effects of fin and rudder on rolling moments due to sideslip and yawing
[ESDU-70006] N72-31992
Frictional and retarding forces on aircraft tyres. Part 2: Estimation of braking force
[ESDU-71026-PT-2] N72-32013
Average gust frequencies subsonic transport aircraft
[ESDU-69023-AMEND-B] N72-32015
Fluid forces, pressures and moments on rectangular blocks
[ESDU-71016] N72-32288
Approximate wave drag of rectangular planform fairings at zero incidence in supersonic flow
[ESDU-71018] N72-32289
Inviscid supersonic flow past cones at zero incidence. 1: Shock angle
[ESDU-70008] N72-32290
Fluid forces acting on circular cylinders for application in general engineering. Part 2: Finite-length cylinders
[ESDU-70014-PT-2] N72-32291
Fluid forces acting on circular cylinders for application in general engineering. Part 1: Long cylinders in two dimensional flow
[ESDU-70013-PT-1] N72-32292
Inviscid supersonic flow past cones at zero incidence. 4: Mach number in the conical flow field
[ESDU-70010] N72-32293
Inviscid supersonic flow past cones at zero incidence. 3: Flow deflection in the conical flow field
[ESDU-70009] N72-32294
Fluid forces and moments on flat plates
[ESDU-70015] N72-32295
The response of first- and second-order systems
[ESDU-69005] N72-32584
Curves for use in the determination of gross thrust and mass flow in flight. [Air breathing ducted-flow engines with convergent nozzles]
[ESDU-69008] N72-32746
The determination of gross thrust and mass flow in flight. [Air breathing ducted-flow engines with convergent nozzles]
[ESDU-69007] N72-32747
Introduction to the measurement of thrust in flight. [Air breathing ducted-flow engines]
[ESDU-69006] N72-32748
Buckling of thin flat orthotropic plates under uniaxial compression
[ESDU-71015] N72-32860
Local buckling of compression panels with flanged stringers
[ESDU-71014] N72-32861
The estimation of r.m.s. stress in stiffened skin panels subjected to random acoustic loading
[ESDU-72005] N72-32862
Bending moment at centre of a strut due to end loads and uniformly distributed side load
[ESDU-01.01.16] N72-32863
Flexural properties of flipped Z and channel section stringers [c/h equals 0.2]
[ESDU-01.00.03] N72-32864
Initial buckling of flat plates under combined longitudinal and transverse direct stress [all edges fixed against rotation]
[ESDU-02.01.40] N72-32865
Fatigue strength of steel screw threads under axial loading [not greater than 1.0 inch diameter]
[ESDU-69001] N72-32866
ESL, INC., SUNNYVALE, CALIF.
Development of optimized techniques and requirements for computer enhancement of structural weld radiographs. Volume 1: Technical report
[NASA-CR-123814] N72-32490
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, GENEVA [SWITZERLAND].
Experimental results on a fast cycling pulsed HV power supply
[CERN-72-5] N72-32235

F

FAIRCHILD INDUSTRIES, INC., GERMANTOWN, MD.
Integrated dynamic analysis simulation of space stations with controllable solar arrays [supplemental data and analyses]
[NASA-CR-112145] N72-32849
FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
FAA flying qualities requirements
N72-32020
Report on live test of a cathode-ray tube [CRT] terminal as an M-28 teletype replacement
[AT-7330-OT] N72-32183
Manti-Ephraim Airport, project 72-1-07-49-0018-01, Ephraim, Utah
[PB-207064-F] N72-32270
Baxley Municipal Airport, Baxley, Georgia
[PB-206167-F] N72-32271
Dade County Airport, Trenton, Georgia
[PB-205578-F] N72-32272
Jasper-Pickens County Airport, Jasper, Georgia
[PB-204959-F] N72-32273
Neillsville Municipal Airport, Neillsville, Wisconsin
[PB-204576-F] N72-32274
Iowa, Ottumwa-Wapello County, Ottumwa Industrial Airport, Iowa
[PB-207235-F] N72-32275
Ashe County Airport Authority, West Jefferson, North Carolina
[PB-206552-F] N72-32276
Hemphill Municipal Airport, Hemphill, Texas
[PB-206262-F] N72-32277
VOR TACAN low altitude flight check summary
N72-32642
Doppler VOR electromagnetic measurements
[TN-6050.23-ADD] N72-32643
FAA views on nondestructive testing
N72-32981
Large and medium hub: Aviation activity forecast air carrier airports, 1967 - 1983
N72-32986
FINNISH ACADEMY OF TECHNICAL SCIENCES, HELSINKI.
A perturbation solution of the deceleration trajectory in ballistic re-entry
[PB-208108] N72-32858
FLORIDA UNIV., GAINESVILLE.
Range laws for distance measuring systems using frequency modulation with a nonlinear triangular waveshape
[AD-744483] N72-32196
Systems engineering applied to the analysis of continuous flow conveyors
[AD-744529] N72-32508
A center of competence in solid state materials and devices
[AD-743834] N72-32724
FORSCHUNGSINSTITUT FUER ANTHROPOTECHNIK, MECKENHEIM [WEST GERMANY].
Pilot workload
N72-32035
FRANKFORD ARSENAL, PHILADELPHIA, PA.
Analysis of the Cook demodulator
[AD-744435] N72-32255
FRANKLIN INST., PHILADELPHIA, PA.
Derivation of a fatigue life model for gears
[AD-744504] N72-32507

G

GENERAL DYNAMICS CORP., SAN DIEGO, CALIF.
Microwave holography for radome analysis
[AD-744072] N72-32526
GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
Space LOX vent system
[NASA-CR-123826] N72-32844
Investigation of structural factors of safety for the space shuttle
[NASA-CR-123837] N72-32845
GENERAL DYNAMICS/FORT WORTH, TEX.
Level 12 NASTRAN experiences at General Dynamics, Convair Aerospace Division, Fort Worth Operations
N72-32882
GENERAL ELECTRIC CO., DAYTONA BEACH, FLA.
Mechanical systems readiness assessment and performance monitoring study
[NASA-CR-128171] N72-32491
GENERAL ELECTRIC CO., HOUSTON, TEX.
Fault tolerant data management system
[NASA-CR-128553] N72-32211
GENERAL ELECTRIC CO., SCHENECTADY, N.Y.
Segregation at grain boundaries and surfaces
[AD-744519] N72-32562
GENERAL LAB. ASSOCIATES, INC., NORWICH, N.Y.
Survey, analysis and evaluation test on high voltage/current pulse transmission cables
[NASA-CR-123815] N72-32221
GENERAL MOTORS CORP., KOKOMO, IND.
Low cost transient suppressors exploratory development
[AD-743996] N72-32242
GENERAL MOTORS RESEARCH LABS., WARREN, MICH.
Experiences in interfacing NASTRAN with another finite element program
N72-32876
Modeling techniques of thin walled beams with open cross sections
N72-32880
GENERAL MOTORS TECHNICAL CENTER, WARREN, MICH.
Measurements of dynamic properties of materials. Volume 6: Tantalum
[AD-741217] N72-32557
GEOLOGICAL SURVEY, ARLINGTON, VA.
Dynamics of suspended sediment plumes in Lake Ontario
[E72-10110] N72-32362
GEOLOGICAL SURVEY, BALTIMORE, MD.
Investigation of basin characteristics extracted from ERTS data for improving regression estimates of streamflow
[E72-10096] N72-32349
GEOLOGICAL SURVEY, CORPUS CHRISTI, TEX.
Monitoring changing geologic features along the Texas Gulf Coast
[E72-10097] N72-32350
GEOLOGICAL SURVEY, DENVER, COLO.
A study of morphology, provenance, and movement of desert sand seas in Africa, Asia and Australia
[E72-10101] N72-32354
I test and evaluation of ERTS-A data applications to a present status inventory of the post-1890 AD episode of accelerated erosion, and to monitoring future erosional changes, with specific reference to the Arizona regional ecological test site
[E72-10104] N72-32357
A study of quaternary landforms and materials in the midwest and Great Plains
[E72-10105] N72-32489
GEOLOGICAL SURVEY, HARRISBURG, PA.
Near real time water resources data for river basin management
[E72-10107] N72-32359
GEOLOGICAL SURVEY, LAKEWOOD, COLO.
Determine the utility of ERTS-1 imagery in the preparation of hydrologic atlases of arid land watersheds
[E72-10113] N72-32364
GEOLOGICAL SURVEY, MCLEAN, VA.
Man-made culture interpretation and culture revision of small scale maps
[E72-10098] N72-32351
Cartographic evaluation of ERTS orbit and attitude data
[E72-10100] N72-32353
Investigation of ERTS/RBV imagery for photomapping of the United States
[E72-10108] N72-32360
GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Remote sensing of permafrost and geologic hazards in Alaska
[E72-10060] N72-32333
Studies of the inner shelf and coastal sedimentation environment of the Beaufort Sea from ERTS-1
[E72-10062] N72-32335
Identification of geostructures of continental crust, particularly as they relate to mineral-resource evaluation
[E72-10095] N72-32348
GEOLOGICAL SURVEY, ST. LOUIS, MO.
Performance of the ERTS data collection system in a total system context
[E72-10093] N72-32346
GEOLOGICAL SURVEY, TACOMA, WASH.
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers
[E72-10103] N72-32356
GEOLOGICAL SURVEY, TUCSON, ARIZ.
Dynamics of distribution and density of phreatophytes and other arid land plant communities
[E72-10114] N72-32365
GEOLOGICAL SURVEY, WASHINGTON, D.C.
Thermal surveillance of volcanoes
[E72-10061] N72-32334
Central Atlantic regional ecological test site: A prototype regional environment information system
[E72-10089] N72-32342
Overall evaluation of ERTS imagery for cartographic application
[E72-10092] N72-32345
Investigation of ERTS-1 images for application to thematic mapping
[E72-10094] N72-32347
The utilization of ERTS-1 generated photographs in the evaluation of the Iranian playas as potential locations for economic and engineering development
[E72-10099] N72-32352
The cartographic application of ERTS/RBV imagery in polar regions
[E72-10102] N72-32355
Land use mapping and modeling for the Phoenix Quadrangle
[E72-10109] N72-32361
Iron absorption band analysis for the discrimination of iron rich zones
[E72-10111] N72-32363
Study of multispectral data, ERTS-A, northwest Saudi Arabia
[E72-10140] N72-32387
GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Further study of snap through behavior of clamped spherical caps
[AD-741198] N72-32917
GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Scattering of acoustic waves by a spherical inclusion in a solid
[RE-440] N72-32655
Some aspects of the NASTRAN program output
N72-32888
Design of NASTRAN demonstration problems
N72-32902
GULTON INDUSTRIES, INC., METUCHEN, N.J.
One hundred ampere-hour nickel-cadmium battery cells of improved design
[NASA-CR-112139] N72-32071

H

HAMILTON STANDARD, WINDSOR LOCKS, CONN.
Raster plotter software. Volume 1: Technical report
[AD-740605] N72-32215
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Transient analysis of an IVHM grapple impact test
N72-32879
HARRY DIAMOND LABS., WASHINGTON, D.C.
Externally excited transmission line: Definition of procedures for determining coupling parameters
[AD-743468] N72-32241
Fluerics 23: A bibliography, revision B
[AD-743800] N72-32320
HARVARD COLL. OBSERVATORY, CAMBRIDGE, MASS.
Shock tube spectroscopy
[AD-744311] N72-32167
Research directed toward the observation and interpretation of solar phenomena
[AD-741783] N72-32790
HARVARD UNIV., CAMBRIDGE, MASS.
Gap-minimal systems of notations and the constructible hierarchy
[NASA-CR-128195] N72-32585
Preparation and optical properties of crystals and films of vanadium oxides
[AD-744319] N72-32735
HAWAII INST. OF GEOPHYSICS, HONOLULU.
Physical and chemical oceanographic and anomalous gravity research
[AD-742342] N72-32423
HAYES INTERNATIONAL CORP., HUNTSVILLE, ALA.
Flat conductor cable connectors with individually sealed contacts
[NASA-TM-X-64695] N72-32231
HONEYWELL, INC., MINNEAPOLIS, MINN.
Design method for fully augmented systems for variable flight conditions
[AD-744491] N72-32068
HONEYWELL, INC., WEST COVINA, CALIF.
Tactical data converter
[AD-744086] N72-32218
HOUSTON UNIV., TEX.
Differential correction schemes in nonlinear regression
[NASA-CR-2119] N72-32587
HRB-SINGER, INC., STATE COLLEGE, PA.
Digital processing of IR scanner video
[AD-744332] N72-32485
HUGHES AIRCRAFT CO., FULLERTON, CALIF.
Acoustic signal processing devices
[AD-744474] N72-32253
HUGHES RESEARCH LABS., MALIBU, CALIF.
Research in interaction of coherent light with solids and with turbulent atmospheres
[AD-744122] N72-32668
HUMAN ENGINEERING LABS., ABERDEEN PROVING GROUND, MD.
Analysis of pilot's eye movements during helicopter flight
[AD-742276] N72-32130
HUMAN FACTORS RESEARCH, INC., GOLETA, CALIF.
A study of recovery functions in man
[AD-741828] N72-32125

I

IBM WATSON RESEARCH CENTER, YORKTOWN HEIGHTS, N.Y.
Electron beam fabrication of high frequency, low loss, wind band-width interdigital acoustic surface wave transducers
[AD-744092] N72-32250
Experimental and theoretical physics
[AD-744524] N72-32740
IIT RESEARCH INST., CHICAGO, ILL.
Microcircuit device environmental data
[AD-744018] N72-32239
ILC, INC., SUNNYVALE, CALIF.
Optical pumps for erbium lasers
[AD-744480] N72-32532
ILLINOIS UNIV., URBANA.
Accomplishment summary 1971-1972 of the Biological Computer Laboratory
[AD-744009] N72-32144
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON [ENGLAND].
Viscous interaction effects on reentry aerothermodynamics: Theory and experimental results
N72-32004
A calculation procedure for the transient and steady state behaviour of shell and tube heat exchangers
[EF/TN/A/48] N72-32944
INSTITUT FUER PLASMAPHYSIK G.M.B.H., GARCHING [WEST GERMANY].
Increase of chemical laser efficiency by gasdynamical pumping
[IPP-IV-10] N72-32522
Investigation of the relation between compression, relaxation, and end losses in the late phases of theta pinch discharges by means of a two dimensional MHD computer programme
[IPP-1/124] N72-32698
INSTITUTE FOR TELECOMMUNICATION SCIENCES, BOULDER, COLO.
Wave propagation along a thin dielectric coated wire buried in the earth
[AD-744078] N72-32199
Theory of electromagnetic reflection from a parallel grid of dielectric coated wires buried in the earth
[AD-744079] N72-32261
INSTITUTE OF NUCLEAR RESEARCH, WARSAW [POLAND].
Radial density distribution of the flux of charged particles in extensive air showers
[INR-1345] N72-32686
Thermodynamic functions of non-thermal radiating systems
[INR-P-1367] N72-32951
INTERNATIONAL BUSINESS MACHINES CORP., HOPEWELL JUNCTION, N.Y.
Mathematical simulation of the effects of ionizing radiation on semiconductors
[AD-744093] N72-32732
INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, TRIESTE [ITALY].
Solid state, plasma, and high energy physics research
[NP-19250] N72-32685
INTERNATIONAL GEOPHYSICAL YEAR WORLD DATA CENTER A, ASHEVILLE, N.C.
High Altitude Meteorological Data, volume 7, no. 12, December 1970
N72-32603

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Development of equilibrium air computer programs suitable for numerical computation using time-dependent or shock-capturing methods
[NASA-CR-2134] N72-32296
Mechanical properties and defects in refractory metals
[IS-2773] N72-32553
IOWA UNIV., IOWA CITY.
The first half century of hydraulic research at the University of Iowa
[BULL-44] N72-32265

J

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
The development, design and test of a 66 W/kg [30-W/lb] roll-up solar array
[NASA-CR-128196] N72-32070
Evaluation of plasma cleaning and electron spectroscopy for reduction of organic contamination
[NASA-CR-128302] N72-32117
Pyrolysis gas chromatography of amino acids and proteins
[NASA-TT-F-14483] N72-32151
Singly-curved reflector for use in high-gain antennas
[NASA-CASE-NPO-11361] N72-32169
Combinatorial coding for discrete stationary sources
[NASA-TT-F-14484] N72-32209
Gain calibration of a horn antenna using pattern integration
[NASA-CR-128299] N72-32232
Pump for delivering heated fluids
[NASA-CASE-NPO-11417] N72-32498
Thick film silicon growth techniques
[NASA-CR-128415] N72-32718
Hydrocarbon polymeric binder for advanced solid propellant
[NASA-CR-128300] N72-32743
Filament-wound graphite/epoxy rocket motor case
[NASA-CR-128417] N72-32766
Hydrocarbon polymeric binder for advanced solid propellant
[NASA-CR-128414] N72-32767
On the possible explanation of period breakdowns of pulsars by their gravitational radiation
[NASA-TT-F-14485] N72-32826
NASTRAN data generation and management using interactive graphics
N72-32892
Generalized characteristics method for elastic wave propagation problems
[NASA-CR-128216] N72-32910
JOHNS HOPKINS UNIV., BALTIMORE, MD.
Laser light scattering studies of phase transitions
[AD-744532] N72-32536
JOINT INST. FOR NUCLEAR RESEARCH, DUBNA [USSR].
Current regulator for superconducting solenoid
[JINR-P13-6231] N72-32234
Beam monochromatization by means of resonator
[JINR-P9-6252] N72-32266
Telescope for recording small energy protons on the intense beta background
[JINR-P13-6261] N72-32477
On experimental determination of the true value p sub f of type-2 superconductors
[JINR-P8-6260] N72-32720
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Reports from the higher educational institutions: Aviation technology
[JPRS-57100] N72-32005
On the influence of the compressibility of air on the aerodynamic characteristics of a wing moving close to the earth's surface at subsonic speeds
N72-32006
Calculation of the aerodynamic characteristics of lifting systems composed of rectangular wings
N72-32007
On the nonlinear theory of lifting surfaces
N72-32008
Calculating the downwash angles behind wings with small spanchord ratios moving at subsonic speeds, according to nonlinear theory
N72-32009
Spatial orientation of bats under the influence of increased gravity
[JPRS-56073] N72-32084
Biomedical problems of space flight
[JPRS-51660] N72-32107
Anomalous water: Hypothesis and facts
[JPRS-57043] N72-32149
Over-the-horizon radar
[JPRS-56925] N72-32175
General purpose modular waveguide assembly
[JPRS-57102] N72-32186
Conference on Automation of Scientific Research Through the Use of Computers
[JPRS-57027] N72-32208
Three-dimensional flow separations during a supersonic flow around solid and gaseous obstacles
[JPRS-56959] N72-32305
Description of chemically equilibrium flows of multicomponent ionized mixtures within the framework of the Navier-Stokes and Prandtl equations
[JPRS-57017] N72-32306
Translations on Eastern Europe scientific affairs, no. 243
[JPRS-56024] N72-32392
Radiation sensor cooling devices
[JPRS-57028] N72-32467
Computer simulation of the movement of a walking apparatus
[JPRS-57018] N72-32499
Safety technique during work with lasers, establishment of laser laboratories, operating rooms using lasers
[JPRS-57029] N72-32516
Use of magnesiothermy for reduction of various metals and alloys
[JPRS-57138] N72-32551
Heading indicating and automatic flight control systems on airplanes of the civil aviation service
[JPRS-57031] N72-32640
Table of contents and foreword of a book on infrared filters
[JPRS-56916] N72-32653
Theory of ramjet and rocket-ramjet engines, part 1
[JPRS-57062-1-PT-1] N72-32757
Theory of ramjet and rocket-ramjet engines, part 2
[JPRS-57062-2-PT-2] N72-32758
Translations on eastern Europe: Scientific affairs, no. 266
[JPRS-56928] N72-32814
Soviet bloc research in geophysics, astronomy, and space, no. 283
[JPRS-56944] N72-32815
Soviet bloc research in geophysics, astronomy, and space, no. 284
[JPRS-57019] N72-32816
Testing metals for tension, impact, and variable loads
[JPRS-57075] N72-32912

K

KANNER [LEO] ASSOCIATES, REDWOOD CITY, CALIF.
Effect of flying on fibrinolytic activity in the blood of jet pilots
[NASA-TT-F-14455] N72-32109
Studies on the pH-dependence, inhibition, and reactivation of angiotensin 2 and angiotensin 2 amide cleaving enzymes of human plasma
[NASA-TT-F-14457] N72-32118
Desorption of oxygen from tungsten by means of electron impact
[NASA-TT-F-14481] N72-32156
Space-time correlations of velocities in duct turbulence
[NASA-TT-F-14463] N72-32314
Geothermograph and meteorophytograph
[NASA-TT-F-14469] N72-32405
Use of infrared aerial photography in detecting areas with excess surface water and ground water outflows
[NASA-TT-F-14461] N72-32406
New method for the study of solid particles in the stratosphere
[NASA-TT-F-14467] N72-32413
Concerning the determination of the sensitivity of hot wire anemothermometers in supersonic flows
[NASA-TT-F-14458] N72-32475
Lasers and thermonuclear fusion
[NASA-TT-F-14465] N72-32518
Study of the physical state of breakdown products by laser action on condensed media
[NASA-TT-F-14476] N72-32520
On the shape of ultramicroscopic gold particles
[NASA-TT-F-14477] N72-32550
Brownian migration of crystallites on a surface: The case of aluminum on KCl; clarification of the slip mechanism, part 3
[NASA-TT-F-14459] N72-32717
On the origin of lunar craters
[NASA-TT-F-14474] N72-32820
Decameter wavelength radio emission of Jupiter as an indication of high velocity fluxes and shockwaves in the solar wind
[NASA-TT-F-14470] N72-32821
Determination of the visual and true colors of noctilucent clouds
[NASA-TT-F-14460] N72-32822
Fragmentation of meteor bodies in flares
[NASA-TT-F-14456] N72-32823
A variable blackbody for temperatures to 4000 K inclusive
[NASA-TT-F-14464] N72-32946
KANSAS STATE UNIV., MANHATTAN.
Wheat: It's water use, production and disease detection and prediction
[E72-10126] N72-32374
KANSAS UNIV., LAWRENCE.
Interpretation and automatic image enhancement processing facility
[E72-10125] N72-32203
Ground pattern analysis in the Great Plains
[E72-10122] N72-32372
Monitoring fresh water resources
[E72-10123] N72-32373
Application of ERTS data to Kansas agriculture
[E72-10127] N72-32375
Use of feature extraction techniques for the texture and context information in ERTS imagery
[E72-10124] N72-32453
KERNFORSCHUNGSZENTRUM, KARLSRUHE [WEST GERMANY].
Creep behavior and time to rupture of the alloy X8CrNiMoNb b 1616 for various pretreatments
[KFK-1512] N72-32552
KIRSCHNER [E. J.] AND ASSOCIATES, WASHINGTON, D.C.
Intermodal transportation careers: A guide for development of educational programs
N72-32980
KLEBER-COLOMBES [FRANCE].
Nonapplicability of linear finite element programs to the stress analysis of tires
N72-32883
KYOTO UNIV. [JAPAN].
On Treders interpretation of Einsteins unified field theory
[RIFP-154] N72-32657

L

LABORATORIO DE ACUSTICA E SONICA, SAO PAULO [BRAZIL].
Acceleration, velocity and displacement measurements in the surface of reciprocating compressor, with octave band analysis, percent bandwidth analysis and numerical values measured
[TR-7205.582] N72-32456
Ultrasonic inspection in the weldment of high pressure high temperature tube
[TR-7205.584] N72-32494
Ultrasonic thickness measurement of damaged zone in 024 inch forged steel tube
[TR-7205.585] N72-32543
Ultrasonic inspection and control of the weldments in two cast steel cylinders
[TR-7206.588] N72-32544
Ultrasonic inspection and control of the weldments in cast steel cylinder
[TR-7206.587] N72-32545
Ultrasonic thickness measurement and corrosion control in cast iron panel used in phenol cracking
[TR-7206.586] N72-32546
LAMONT-DOHERTY GEOLOGICAL OBSERVATORY, PALISADES, N.Y.
Long-period seismological research program
[AD-744130] N72-32443
LIEGE UNIV. [BELGIUM].
Celestial spectra and atmospheric effects on radiation mainly in the infrared
[AD-744087] N72-32445
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Backscatter from a moving target in a randomly fluctuating slab application to a vegetated environment
[AD-744049] N72-32189
EuTe. 1: Magnetic behavior of insulating and conducting single crystals
[AD-742603] N72-32722
LINKABIT CORP., SAN DIEGO, CALIF.
Hybrid coding systems study
[NASA-CR-114486] N72-32206
LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Variations of atmospheric density near 400 km with magnetic activity during the storm period of 28 September to 2 October 1969
[NASA-CR-122479] N72-32390
Elimination of reading ambiguity in digital measuring devices
N72-32465
Some results of spectrophotometry of natural formations from the manned Soyuz-9
N72-32466
Kinetics of metal evaporation. Surface temperature
N72-32540
Computation of the operating range of night vision devices
N72-32656
On the steady creep of shells of revolution in the Treak criterion case
N72-32906
On the rate of pressure drop upon insertion of a cooling substance in a half-closed volume
N72-32941
Cycle of a theoretical gas refrigerator without dead volumes
N72-32942

Optimal parameters of a low temperature unit with a gas regenerative cycle
N72-32945
LOCKHEED-CALIFORNIA CO., BURBANK.
Adaptation of NASTRAN to an integrated system of structural design analysis
N72-32885
LOCKHEED-GEORGIA CO., MARIETTA.
Annealed foil fatigue sensor development
[AD-743968] N72-32058
LONDON UNIV. [ENGLAND].
Criteria for stall and post stall gyrations
N72-32029
LOS ALAMOS SCIENTIFIC LAB., N.MEX.
Medium-Energy Physics program
[LA-4899] N72-32267
Nanosecond framing cameras using proximity focused image intensifiers
[LA-4937] N72-32479
Central station power generation by laser-driven fusion
[LA-4858-VOL-1] N72-32521
Verdet constant measurements for Faraday rotator development
[LA-4921] N72-32573
LOUGHBOROUGH UNIV. OF TECHNOLOGY [ENGLAND].
Research report of the Particle Technology Group, 1969 - 1970
N72-32672
The application of feasible direction methods of nonlinear programming to some structural optimization problems
[MATH-RES-9] N72-32903
LOUISIANA POLYTECHNIC INST., RUSTON.
Use of NASTRAN as a teaching aid
N72-32894

M

MAINE DEPT. OF TRANSPORTATION, AUGUSTA.
To develop a land use-peak runoff classification system for highway engineering purposes
[E72-10088] N72-32341
MARQUARDT CORP., VAN NUYS, CALIF.
Technology development of a biowaste resistojet, volume 2
[NASA-CR-112150] N72-32761
MARTIN MARIETTA CORP., BALTIMORE, MD.
Asymmetric hypersonic flow
[NASA-CR-2123] N72-32297
MARTIN MARIETTA CORP., DENVER, COLO.
Investigate optimum way of adding wideband capability and recommend a design for modification of one government furnished AM baseband demultiplexer, phase 1
[NASA-CR-123825] N72-32172
MARYLAND UNIV., COLLEGE PARK.
A study of phycophysiology in controlled environments
[NASA-CR-128296] N72-32082
Asymptotic algebraic realization of SU[3], baryon classification, g sub A][0] and D/F ratio
[TR-72-065] N72-32671
Spontaneously broken weak and electromagnetic interaction symmetry and three triplet model for hadrons
[TR-72-022] N72-32674
Diagonal structure of the S matrix in the Lee model
[TR-73-023] N72-32675
Modulation of cosmic ray electrons
[NASA-CR-128282] N72-32776
Transport properties of gases and binary liquids near the critical point
[NASA-CR-2112] N72-32938
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Static and dynamic nonlinear structural problems
[AD-744114] N72-32067
Low cycle compressive fatigue failure of E glass-epoxy composites
[AD-744113] N72-32581
An algorithm for terminal air traffic control
[NASA-CR-128298] N72-32639
Guidance system operations plan for manned CM earth orbital missions using program SKYLARK 1. Section 4: Operational modes
[NASA-CR-128544] N72-32641
Concept development and evaluation of airborne traffic displays
[FTL-R71-2] N72-32644
Diffusion in the lead chalcogenides
[AD-743485] N72-32727
Vibration of a cavity-backed panel
[AD-743865] N72-32919
MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Analysis of fungal type isolates taken from a 90-day manned test of an advanced regenerative life support system
[NASA-CR-112018] N72-32115
Modular space station program option
[NASA-CR-123759] N72-32842
A design study for the addition of higher order parametric discrete elements to NASTRAN
N72-32889
Stress-wave Propagation And Dynamic Effects in Shells [SPADES]. Micromechanical stress-wave response of 3-D quartz phenolic. Book 1: Development of Bloch-Fourier analysis
[AD-743898] N72-32918
MCDONNELL-DOUGLAS ASTRONAUTICS CO., ST. LOUIS, MO.
Refurbishment cost study of the thermal protection system of a space shuttle vehicle, phase 2
[NASA-CR-112123] N72-32847
MEDICAL COLL. OF SOUTH CAROLINA, CHARLESTON.
Nonequilibrium crystallization of carbon dioxide in a ducted axisymmetric jet
[AD-744338] N72-32737
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH [WEST GERMANY].
V/STOL handling qualities criteria compared with flight test results of the V/STOL supersonic fighter VJ 101C and the V/STOL transport aircraft DO 31E
N72-32024
MIAMI UNIV., OXFORD, OHIO.
Chemical, structural and analytical research
[AD-744107] N72-32166
MICHIGAN STATE UNIV., EAST LANSING.
Choosing among alternative distributions of rewards
[AD-741176] N72-32143
MICHIGAN UNIV., ANN ARBOR.
Simulator evaluation of pilot assurance derived from an airborne traffic situation display
[FAA-EM-72-3] N72-32137
Acoustic signal processing
[AD-744024] N72-32190
Preliminary reports, memoranda and technical notes of the ARPA Materials Summer Conference, volume 1
[AD-744204] N72-32564
Preliminary reports, memoranda and technical notes of the ARPA Materials Summer Conference. Volume 2: Environmental degradation of stressed materials
[AD-744205] N72-32565
Microinstabilities in inhomogeneous plasma
[COO-1478-10] N72-32705
OGO-6 data analysis
[NASA-CR-130058] N72-32813
MIDWEST RESEARCH INST., KANSAS CITY, MO.
Economic impact of stimulated technological activity. Part 2: Case study, technological progress and commercialization of communications satellites
[NASA-CR-128199] N72-32174
MINNESOTA UNIV., MINNEAPOLIS.
Study of parachute forces and canopy pressure distribution measured in a subsonic wind tunnel under infinite mass conditions
[AD-744103] N72-32063
MITRE CORP., MCLEAN, VA.
Concepts, design and description for the upgraded third generation air traffic control system, as of January 1972. CONUS ATC system. Oceanic ATC system
[AD-743635] N72-32645
MITSUBISHI HEAVY-INDUSTRIES, LTD., TOKYO [JAPAN].
Finite element method with consideration to the continuity of normal slope
[TB-79] N72-32908
MOLINS MACHINE CO. LTD., DEPTFORD [ENGLAND].
The tribiological aspects of carbon fibre reinforced plastics
[D-MAT-173] N72-32574
MONITOR LABS., INC., ROCKVILLE, MD.
Development of data acquisition facilities and data analysis services applicable to experimental hyperbaric physiology
[AD-744053] N72-32129
MONTANA UNIV., MISSOULA.
Applicability of ERTS-A to Montana geology
[E72-10141] N72-32388

N

NAGOYA UNIV. [JAPAN].
Characteristic oscillations of a sheet plasma
[IPPT-132] N72-32694
NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA [ONTARIO].
Parameters affecting lateral directional handling qualities at low speeds
N72-32033
On atomization and linearized free-surface instability on rotating bodies
[NRC-12765] N72-32310
NATIONAL AERONAUTICAL LAB., BANGALORE [INDIA].
Aeronautical research and technology
N72-32958
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Revisions to V/STOL handling qualities criteria of AGARD report 408
N72-32021
Experimental study of wall boundary layer growth in the 10 deg half angle conical nozzle of a reflected shock tunnel
[NASA-TM-X-2647] N72-32317
Calibration of radiation detectors in the ultraviolet region between 972 and 2500 A
[NASA-TN-D-6991] N72-32474
Low keV electron probe analysis of silicate minerals for Mg, Al, and Si using pure-element standards
[NASA-TM-X-62185] N72-32570
Economic study of future aircraft fuels [1970-2000]
[NASA-TM-X-62180] N72-32742
Project Cyclops: A design study of a system for detecting extraterrestrial intelligent life
[NASA-TM-X-68634] N72-32827
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Radio astronomy Explorer B antenna aspect processor
[NASA-TM-X-66032] N72-32173
The 136 MHZ/400 MHz earth station antenna-noise temperature prediction program for RAE-B
[NASA-TM-X-66047] N72-32184
Propagation of radio waves through the lower atmosphere of Venus
[NASA-TM-X-66046] N72-32185
A character string scanner
[NASA-TM-X-66033] N72-32207
Modification to the MED and LED source-encoding circuitry for the IMP H and J spacecraft
[NASA-TM-X-66030] N72-32226
A feedback control model for network flow with multiple pure time delays
[NASA-TM-X-66020] N72-32258
Tracking of the ATS-3 synchronous satellite by the Very Long Baseline Interferometer [VLBI] technique
[NASA-TM-X-66018] N72-32263
The distribution of NO2[plus] in the lower ionosphere
[NASA-TM-X-66024] N72-32395
Deformation and instability of underthrusting lithospheric plates
[NASA-TM-X-66028] N72-32397
Transition region response of the symmetric double probe and its application in the lower ionosphere
[NASA-TM-X-66013] N72-32400
Determination of the geoid from satellite altimeter data
[NASA-TM-X-66016] N72-32401
Earth zonal harmonics from rapid numerical analysis of long satellite arcs
[NASA-TM-X-66039] N72-32402
Observations of the global structure of the stratosphere and mesosphere with sounding rockets and with remote sensing techniques from satellites
[NASA-TM-X-66044] N72-32417
Estimation of sea surface temperature from remote measurements in the 11-13 micron window region
[NASA-TM-X-66053] N72-32418
Provisional hourly values of equatorial Dst for January to June 1972
[NASA-TM-X-66052] N72-32419
The application of color display techniques for the analysis of Nimbus infrared radiation data
[NASA-TN-D-6786] N72-32462
Energy calibration of a cosmic ray ionization spectrometer
[NASA-TM-X-66037] N72-32463
Reply to a paper on the use of two magnetometers for magnetic field measurements on a spacecraft
[NASA-TM-X-66041] N72-32464
Circular piezoelectric bender laser tuners
[NASA-TM-X-66040] N72-32515
Surface refractivity measurements at NASA spacecraft tracking sites
[NASA-TN-D-6822] N72-32608
Theoretical and observational analysis of spacecraft fields
[NASA-TM-X-66036] N72-32654
Divergence of the total cross section for three body rearrangement collisions with coulomb interactions
[NASA-TM-X-66054] N72-32682
Low energy electron experiment for AE-C and AE-D
[NASA-TM-X-66051] N72-32683
A comparative study of electrical probe techniques for plasma diagnostics
[NASA-TM-X-66014] N72-32692
Equatorial ionospheric absorption during half a solar cycle [1964-1970]
[NASA-TM-X-66029] N72-32778
Energetic electrons from solar flares and associated type 3 radio bursts from metric to hectometric wave frequencies
[NASA-TM-X-66031] N72-32779
Calculations of synchrotron emission from the terrestrial radiation belts
[NASA-TM-X-66015] N72-32781

Modulation of low energy cosmic rays
[NASA-TM-X-66019] N72-32782
Latitude and local time dependence of precipitated low energy electrons at high latitudes
[NASA-TM-X-66035] N72-32783
Early missions to comets
[NASA-TM-X-66026] N72-32810
The intrinsic values and color excesses of [B-V] for 115 F-K supergiants
[NASA-TM-X-66025] N72-32811
Tropospheric range-rate tracking data correction
[NASA-TM-X-66017] N72-32812
The formation of interstellar diatomic molecules
[NASA-TM-X-66056] N72-32839
The interstellar redding law in the ultraviolet deduced from filter photometry obtained by the OAO-2 satellite
[NASA-TM-X-66055] N72-32840
Cometary Explorer to Grigg-Skjellerup 1977
[NASA-TM-X-66023] N72-32850
Preliminary study of the application of the Timation 3 satellite to earth physics
[NASA-TM-X-66012] N72-32851
Technical and social impact of NASTRAN
N72-32870
NASTRAN buckling analysis of a thin walled cylinder
N72-32872
Delta launch vehicle isogrid structure NASTRAN analysis
N72-32877
Comparison of NASTRAN and STARDYNE static analysis of a graphite fiber reinforced plastic truss structure
N72-32886
NASTRAN thermal analyzer: A general purpose finite element heat transfer computer program
N72-32897
VIEW: A modification of the RAVFAC view factor program for use with the NASTRAN thermal analyzer
N72-32898

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Operation and maintenance, fire rescue air-pack. Volume 2: Communications
[NASA-CR-68614] N72-32135
Hurricane Preparedness and Control Plan
[NASA-TM-X-68615] N72-32605
Atlas/Centaur-29 Intelsat 4 [F5], operations summary
[NASA-TM-X-68626] N72-32818

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, LANGLEY STATION, VA.
Dynamic stability derivatives at angles of attack from minus 5 deg to 90 deg for a variable-sweep fighter configuration with twin vertical tails
[NASA-TN-D-6909] N72-32044
Three-track runway and taxiway profiles measured at international airports I and J
[NASA-TN-D-6932] N72-32045
A program for calculating expansion-tube flow quantities for real-gas mixtures and comparison with experimental results
[NASA-TN-D-6830] N72-32300
Initial development of a hypersonic free mixing layer
[NASA-TM-X-2602] N72-32318
Deposition apparatus
[NASA-CASE-LAR-10541-1] N72-32487
Comparison of exact and approximate evaluations of the single-scattering integral in nucleon-deuteron elastic scattering
[NASA-TN-D-6884] N72-32679
Mars gravitational field estimation error
[NASA-TN-D-6949] N72-32834
Flow field measurements around a Mars lander model using hot film anemometers under simulated Mars surface conditions
[NASA-TN-D-6820] N72-32853
Flight test of an erectable spacecraft used for decelerator testing at simulated Mars entry conditions
[NASA-TN-D-6910] N72-32855
NASTRAN: Users' experiences
[NASA-TM-X-2637] N72-32867
NASTRAN: A progress report
N72-32868
Stress and buckling analysis of a double-bubble tank structure
N72-32873
Some applications of NASTRAN to the buckling of thin cylindrical shells with cutouts
N72-32874
An isoparametric quadrilateral membrane element for NASTRAN
N72-32887
Applications of NASTRAN to nuclear problems
N72-32896
Applications of NASTRAN substructuring
N72-32901
Static structural tests of a 1.5-meter diameter fabric attached inflatable decelerator
[NASA-TN-D-6929] N72-32911

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Jet aircraft engine noise reduction
[NASA-TM-X-68131] N72-32043
Design and cold-air investigation of a turbine for a small low-cost turbofan engine
[NASA-TN-D-6967] N72-32072
Gadolinium-hydrogen ion exchange of zirconium phosphate
[NASA-TN-D-7053] N72-32155
A digital simulation of message traffic for natural disaster warning communications satellite
[NASA-TM-X-68135] N72-32182
An application of interactive graphics to neutron spectrometry
[NASA-TM-X-68062] N72-32205
Relabeling of finite element meshes using a random process
[NASA-TM-X-2660] N72-32212
High power laser apparatus and system
[NASA-CASE-XLE-2529-3] N72-32229
Total pressure averaging in pulsating flows
[NASA-TM-X-68128] N72-32316
Modularized instrument system for turbojet engine test facilities
[NASA-TM-X-68123] N72-32458
Pyrometer for measurement of surface temperature distribution on a rotating turbine blade
[NASA-TM-X-68113] N72-32459
Enhanced diffusion welding
[NASA-CASE-LEW-11388-1] N72-32500
Rocket chamber and method of making
[NASA-CASE-LEW-11118-1] N72-32501
Metal-metal laminar composites for high temperature applications
[NASA-TM-X-68056] N72-32541
Access to uncombined titanium through an inhibiting film in sublimation pumping of deuterium
[NASA-TM-X-68119] N72-32542
Hodographic approach to predicting inelastic strain at high temperature
[NASA-TN-D-6937] N72-32547
Effect of aging at 1040 C [1900 F] on the ductility and structure of a tantalum alloy, T-111
[NASA-TN-D-6988] N72-32549
Adhesion and transfer of polytetrafluorethylene to metals studied by Auger emission spectroscopy
[NASA-TN-D-6983] N72-32571
Some efficient methods for obtaining infinite series solutions of n-th order linear ordinary differential equations
[NASA-TR-R-390] N72-32590
Cesium-diode performances from the 1963-to-1971 Thermionic Conversion Specialist Conferences
[NASA-TM-X-2589] N72-32650
Amorphous magnetism in fcc Vicalloy 2
[NASA-TM-X-68127] N72-32652
Structure of zirconium-93 and zirconium-91 as shown by the reactions Zr-92[d,p]Zr-93 and Zr-92[d,t]Zr-91
[NASA-TN-D-6911] N72-32673
Deformed Brueckner-Hartree-Fock calculations
[NASA-TM-X-68134] N72-32678
Ion heating mechanism in a modified Penning discharge
[NASA-TN-D-6985] N72-32695
Twisted, multifilament Nb3Sn superconductive ribbon
[NASA-TM-X-68124] N72-32715
Fabrication studies of Nb3Al superconductors
[NASA-TM-X-68126] N72-32716
Aircraft engine pollution reduction
[NASA-TM-X-68129] N72-32754
Quasi-three-dimensional calculation of velocities in turbomachine blade rows
[NASA-TM-X-67959] N72-32759
Sputtering holes with ion beamlets
[NASA-CASE-LEW-11646-1] N72-32760
Drive turbine system for 20-inch turbofan simulators. 2: Core turbine design
[NASA-TM-X-68130] N72-32762
A concept for jet noise suppression for an afterburning turbojet engine
[NASA-TM-X-68144] N72-32763
Effective specific impulse of external nuclear pulse propulsion systems
[NASA-TN-D-6984] N72-32764
Aerodynamic and acoustic performance of two choked flow inlets under static conditions
[NASA-TM-X-2629] N72-32765
Centaur space vehicle pressurized propellant feed system tests
[NASA-TN-D-6876] N72-32856
Correlation for temperature profiles in the plane of symmetry downstream of a jet injected normal to a crossflow
[NASA-TN-D-6966] N72-32939
Comparison of heat transfer characteristics of three cooling configurations for air-cooled turbine vanes tested in a turbojet engine
[NASA-TM-X-2580] N72-32949
Average heat-transfer characteristics of a row of circular air jets impinging on a concave surface
[NASA-TM-X-2657] N72-32950

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MANNED SPACECRAFT CENTER, HOUSTON, TEX.
Mission requirements: Second Skylab Mission SL-3, volume 2
[NASA-TM-X-68613] N72-32808
Apollo experience report: Lunar module electrical power subsystem
[NASA-TN-D-6977] N72-32848
Apollo experience report: Photographic equipment and operations during manned space-flight programs
[NASA-TN-D-6972] N72-32852
Apollo command module land impact tests
[NASA-TN-D-6979] N72-32857

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Flat conductor cable applications
[NASA-TM-X-64672] N72-32222
Flat conductor cable connectors with individually sealed contacts
[NASA-TM-X-64695] N72-32231
Fabrication and testing of scatter plates for interferometry
[NASA-TM-X-64691] N72-32473
Coaxial high density, hypervelocity plasma generator and accelerator with ionizable metal disc
[NASA-CASE-MFS-20589] N72-32688
Complex eigenvalue analysis of rotating structures
N72-32881

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Effect of the vortex springing from a helicopter blade tip on the flow around the next blade
[NASA-TT-F-14462] N72-32012
Recent NASA handling qualities research
N72-32038
Study of aircraft noise during take-off
[NASA-TT-F-14468] N72-32042
For the study of nickel hydroxide electrodes. 1: Through nickel [2] hydroxide hydrate
[NASA-TT-F-14449] N72-32073
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 104, July 1972
[NASA-SP-7011[104]] N72-32080
Question of the daily periodical hearing in a period in conditions of exposure to prolonged noise
[NASA-TT-F-14568] N72-32089
Influence of mediation and the presence of an observer on the number of agreements reached in negotiation
[NASA-TT-F-14482] N72-32110
Water-soluble filters and their use in bacterial counts
[NASA-TT-F-14440] N72-32111
Studies of bacteriological bioluminescence. Action of magnesium salt
[NASA-TT-F-14431] N72-32112
On a formal inconsistency deduced from the concept of gelification of multifunctional macromolecular compounds according to classical theory
[NASA-TT-F-14487] N72-32152
On the interpretation of the infinite value of the degree of polymerization according to classical theory
[NASA-TT-F-14486] N72-32153
A contribution to research on nickel hydroxides
[NASA-TT-F-14448] N72-32157
The digital recording system of the air-shower experiment in Kiel
[NASA-TT-F-14433] N72-32213
Propagation of shock waves in polytropic gas spheres
[NASA-TT-F-14438] N72-32315
Checking and analyzing soil temperature measurements. Part 1: Testing results with the aid of tautochrone plots
[NASA-TT-F-14479] N72-32407
On the problem of techniques for measuring soil surface temperatures
[NASA-TT-F-14471] N72-32408
Keplerian movement and harmonic oscillators
[NASA-TT-F-14422] N72-32409
On the relationship between mesospheric circulation and the frequency of noctilucent clouds
[NASA-TT-F-14415] N72-32410
First results on rapid registration of electro-atmospheric discharge
[NASA-TT-F-14417] N72-32411
On noctilucent clouds
[NASA-TT-F-14414] N72-32412
Theory of parametric processes in plasma and determination of electron concentration on the polar ionosphere
[NASA-TT-F-14589] N72-32414
Kinetic theory of the upper atomosphere
[NASA-TT-F-14434] N72-32416
Sensitivity of radiotelescopes and correlation receivers
[NASA-TT-F-14441] N72-32469
A new instrument with a spherical attachment for the measurement of UV-radiation incidence at an arbitrary angle
[NASA-TT-F-14416] N72-32470

On an instrument for the measurement of ultraviolet radiation equipped with a spherical attachment for the measurement of radiation incident at a large angle
[NASA-TT-F-14418] N72-32471
Sensitivity of the laser emission spectrography method in the analysis of nonconductive powder samples
[NASA-TT-F-14478] N72-32519
A generalization of the Regula Falsi for the approximate calculation of null points of a system of nonlinear equations
[NASA-TT-F-14420] N72-32588
Estimation of error for approximate solutions of systems of first-order differential equations
[NASA-TT-F-14432] N72-32591
Relation between systems of polynomials orthogonal with respect to various distribution functions
[NASA-TT-F-14480] N72-32592
Physical and technological conditions of modeling acoustical fields in architectural acoustics
[NASA-TT-F-14466] N72-32658
Quantum theory of the glowing electron, I
[NASA-TT-F-14450] N72-32676
Quantum theory of the glowing electron, 2
[NASA-TT-F-14451] N72-32677
Excitation of atoms by electron impacts, as applied to the excitation of resonance transitions in the isoelectronic series of lithium and sodium
[NASA-TT-F-14430] N72-32680
Theory of scattering of fast charged particles. 3: Multiple scattering of tracks and the influence of statistical coupling
[NASA-TT-F-14426] N72-32681
Rotating discontinuities in the solar wind
[NASA-TT-F-14473] N72-32785
Study of angular and spectral distribution of earth's radiation in the infrared field of spectrum conducted from the earth's explorer Kosmos-45
[NASA-TT-F-14442] N72-32787
The Martian crest
[NASA-TT-F-13919] N72-32817
Variation of a meteor spectrum during the time of flight
[NASA-TT-F-14490] N72-32819
The cause of meteor flares
[NASA-TT-F-14475] N72-32824
Collection and examination of meteor dust
[NASA-TT-F-14472] N72-32825
Numerical experiences concerning the calculation of perturbation in celestial mechanics with the method of spinor regularization
[NASA-TT-F-14445] N72-32828
Observation of the diminution of star brightness seen through the central region of Burnham's comet [1959 k]
[NASA-TT-F-14453] N72-32829
Rubidium-strontium measurements on Bosumtwi crater glasses and Ivory Coast tektites
[NASA-TT-F-14437] N72-32830
General expressions of the development in series of the coordinates of a celestial body
[NASA-TT-F-14444] N72-32832
Stellar evolution. 5: The carbon-flash in a star of 5 solar masses
[NASA-TT-F-14427] N72-32835
The physical light variation of the planets Saturn and Uranus
[NASA-TT-F-14419] N72-32836
Evolution with neutrino losses and thermal pulses of the helium-shell source in a star of 5 solar masses
[NASA-TT-F-14452] N72-32838
The fourteen French satellites
[NASA-TT-F-14604] N72-32854
NASTRAN: Dissemination experiences and user benefits
N72-32869
Heat transfer investigations of axisymmetric bodies at hypersonic speeds by means of infrared measurement
[NASA-TT-F-14509] N72-32934
Measurement of the energy supply for low voltage wire bridge igniters
[NASA-TT-F-14525] N72-32935
To the theory on radiation transfer in a non-homogeneous medium
[NASA-TT-F-14443] N72-32947

NATIONAL AEROSPACE LAB., AMSTERDAM [NETHERLANDS].
NLR report for the year 1971
N72-32973

NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, N.J.
Evaluation of insulation for crash fire protection of new flight recorders
[FAA-NA-72-49] N72-32937

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Continuous liquid level measurements with time domain reflectometry
[NASA-CR-128198] N72-32460

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Testing and fabrication of wire-bond electrical connections - A comprehensive survey
[NBS-TN-726] N72-32225
Standard reference materials price and availability list
[NBS-SP-360] N72-32569
Extension of a capacity concept to dual use runways and multi-runway configurations
[AD-744481] N72-32648
The effects of sonic boom and similar impulsive noise of structures
[NTID300.12] N72-32913
The international system of units [SI]
[NBS-SP-330-1972] N72-32968

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D.C.
Evaluation of a technique for the analysis and forecasting of tropical cyclone intensities from satellite pictures
[NOAA-TM-NESS-42] N72-32607
Satellite measurements of aerosol backscattered radiation from the Nimbus F earth radiation budget experiment
[NOAA-TR-NESS-60] N72-32780

NATIONAL LENDING LIBRARY FOR SCIENCE AND TECHNOLOGY, BOSTON SPA [ENGLAND].
Evaluation of quality of lateral coring diagrams
[NLL-RTS-6743] N72-32256
Effects exerted on spray characteristics of spiral type injection valves by ambient air pressures
[NLL-RTS-7250] N72-32287
A telescope with a 6-metre mirror
[NLL-RTS-7353] N72-32449
The model of the big telescope on an altazimuth mounting
[NLL-RTS-7354] N72-32450
The influence of background compensation in X-ray radiometric logging
[NLL-RTS-6739] N72-32451
Investigation of single traces of impact and products of wear in abrasive erosion
[NLL-RTS-7374] N72-32488
A radiographic investigation of the structural changes on electrodes under the action of single impulse discharges
[NLL-RTS-7269] N72-32538
A theory of stratiform cloud. 1: The general equations
[NLL-RTS-7056] N72-32597
A theory of stratiform cloud. 2: The evolution of cloud in a nonperturbed atmosphere
[NLL-RTS-7057] N72-32598
A theory of stratiform cloud. 3: The effect of turbulent diffusion on the cloud drop spectrum
[NLL-RTS-7058] N72-32599
A theory of stratiform cloud. 4: The evolution of a low layer cloud in the transformation of the air mass by the action of the underlying surface
[NLL-RTS-7059] N72-32600
A theory of stratiform cloud. 5: The effect of turbulent diffusion on the spectrum of large drops
[NLL-RTS-7060] N72-32601
A theory of stratiform cloud. 6: A simpler model of a three-phase stratiform cloud
[NLL-RTS-7061] N72-32602
The mechanism of heat transfer between a surface and heterogeneous fluidised bed of granular material
[NLL-RTS-7421] N72-32932

NATIONAL MATERIALS ADVISORY BOARD, WASHINGTON, D.C.
Processes for rutile substitutes
[NMAB-293] N72-32548
Testing for prediction of material performance in components and structures
[AD-743991] N72-32920

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SILVER SPRING, MD.
Atmospheric transport and diffusion in the planetary boundary layer, July 1970 - June 1971
[TID-25979] N72-32610

NATIONAL PHYSICAL LAB., TEDDINGTON [ENGLAND].
The international system of units [SI]
[NBS-SP-330-1972] N72-32968

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA [ONTARIO].
Axisymmetric contact problem for linear viscoelastic bodies
[NRC-TT-1572] N72-32909

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
Federal support to universities and colleges reaches $3.5 billion in fiscal year 1971
[NSF-72-316] N72-32962

NATIONAL TECHNICAL UNIV., ATHENS [GREECE].
Long term scientific forecast for geodesy and photogrammetry
[AD-744347] N72-32444

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D.C.
Special study: Midair collisions in US civil aviation, 1969 - 1970
[NTSB-AAS-72-6] N72-32046

NAVAL AEROSPACE MEDICAL RESEARCH LAB., PENSACOLA, FLA.
Orientation-error accidents in regular Army aircraft during fiscal year 1969: Relative incidence and cost
[AD-743483] N72-32061

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Study of flight-load parameters of the Navy flight demonstration team F-4J aircraft
[AD-743476] N72-32050
Evolution and description of the tracers ground to air escape/rescue system
[AD-743477] N72-32059
Test plan report for arrested landing fatigue test of model E-2 A/B airplane
[AD-743478] N72-32060
The dynamic environment during emergency descent of high altitude/multi-Mach transport aircraft
[AD-741686] N72-32131

NAVAL AIR SYSTEMS COMMAND, WASHINGTON, D.C.
Recent US Navy flying qualities research
N72-32037

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Layered pavement systems. Part 1: Layered system design. Part 2: Fatigue of plain concrete
[AD-742337] N72-32916

NAVAL ELECTRONICS LAB. CENTER, SAN DIEGO, CALIF.
Excitation of the earth ionosphere waveguide by a vertical dipole at satellite heights [theory]
[AD-744241] N72-32197

NAVAL ORDNANCE LAB., WHITE OAK, MD.
Radar target approach simulator
[AD-744242] N72-32286
Carbon fiber surface treatments
[AD-743469] N72-32577

NAVAL ORDNANCE STATION, INDIAN HEAD, MD.
The manufacture of spherical aluminum powder by the fluid energy mill process
[AD-743484] N72-32744

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Techniques for sidelobe cancelation
[AD-743742] N72-32193
A fixed base variable stability Carrier Approach Landing Simulator [CALS]
[AD-743768] N72-32283
General circulation experiments with a two level quasi-geostrophic model including nonlinear interaction between two waves and the mean flow
[AD-743766] N72-32433
A three dimensional staggered grid primitive equation model for application of mesoscale atmospheric motions
[AD-742945] N72-32615
Forecasting the motion of northeastern Pacific tropical cyclones
[AD-743763] N72-32628
A statistical model of atmospheric temperature signals
[AD-743760] N72-32629
Numerical integration experiments with a barotropic primitive equation model
[AD-743748] N72-32630

NAVAL RESEARCH LAB., WASHINGTON, D.C.
Report of NRL Progress, August 1972
N72-32977

NAVAL SHIP ENGINEERING CENTER, PHILADELPHIA, PA.
An experimental and theoretical investigation of conic entrance orifice performance in the low Reynolds number domain
[AD-743479] N72-32323

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Generation and propagation of vorticity under the perfect-slip condition
[AD-743489] N72-32324
Laminar flow circulation in a rotating tank with a spinning cover
[AD-744238] N72-32331
The BANDIT computer program for the reduction of matrix bandwidth for NASTRAN
N72-32893

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, WASHINGTON, D.C.
The NASTRAN contour plotter
N72-32891

NAVAL TRAINING DEVICE CENTER, ORLANDO, FLA.
Evaluation of solid state image intensifier screen
[AD-743956] N72-32243

NAVAL UNDERWATER SYSTEMS CENTER, NEWPORT, R.I.
Utilization of temperature sensitive liquid crystals for thermal analysis and an application to transducer investigations
[AD-744211] N72-32198

NAVAL WEAPONS LAB., DAHLGREN, VA.
Preliminary equation system describing the effect of stacking faults on ultrasonic reflectivity
[AD-744240] N72-32729
NAVAL WEATHER SERVICE COMMAND, WASHINGTON, D.C.
Summary of synoptic meteorological observations. Japanese and Korean coastal marine areas, volume 5. Area 13: Central east China Sea. Area 14: Northern east China Sea. Area 15: Nagasaki
[AD-743488] N72-32614
NEBRASKA UNIV., LINCOLN.
Thin film interfaces. Properties of very thin coatings for electrical applications
[AD-744065] N72-32723
NEW HAMPSHIRE UNIV., DURHAM.
Observations of large scale ionospheric irregularities using a long baseline interferometer
[AD-743950] N72-32434
NEW MEXICO STATE UNIV., UNIVERSITY PARK.
Research and development of antennas for rocket and satellite data transmission
[AD-744095] N72-32251
NEW MEXICO UNIV., ALBUQUERQUE.
An automatic antenna impedance compensator for reentry vehicles
[AD-743994] N72-32244
Low temperature investigations of epitaxial silicon using the micro-Hall device
[AD-744343] N72-32728
NEW YORK UNIV., N.Y.
Abstracts of Sherwood Theoretical Meeting, 22-23 March 1971
[NYO-3077-185] N72-32707
Heat transfer distribution on a discontinuously convective cooled surface
[NASA-CR-112047] N72-32933
NORTH AMERICAN ROCKWELL CORP., DOWNEY, CALIF.
Orbital operations study. Volume 1: Mission analysis
[NASA-CR-128203] N72-32795
Orbital operation study. Volume 2: Interfacing activities analysis. Part 1: Introduction and summary
[NASA-CR-115721] N72-32796
Orbital operations study. Volume 2: Interfacing activities analysis. Part 2: Structural and mechanical group
[NASA-CR-115722] N72-32797
Orbital operations study. Volume 2: Interfacing activities analyses. Part 3: Data management activity group
[NASA-CR-115723] N72-32798
Orbital operations study. Volume 2: Interfacing activities analysis. Part 4: Support operations activity group
[NASA-CR-115724] N72-32799
Orbital operation study. Volume 3: Basic vehicle summaries
[NASA-CR-115725] N72-32800
Orbital operations study. Appendix A: Interactivity analysis
[NASA-CR-115727] N72-32801
Orbital operations study. Appendix B: Operational procedures
[NASA-CR-128202] N72-32802
Orbital operations study. Appendix C: Data sources and vehicle descriptions
[NASA-CR-128201] N72-32803
Orbital operations study. Executive summary
[NASA-CR-115726] N72-32804
NORTH AMERICAN ROCKWELL CORP., LOS ANGELES, CALIF.
Flying qualities interaction with elastic airframes
N72-32031
NORTH CAROLINA SCIENCE AND TECHNOLOGY RESEARCH CENTER, RESEARCH TRIANGLE PARK.
A study of computer terminals for information retrieval applications
[TR-126] N72-32204
NORTH CAROLINA UNIV., CHAPEL HILL.
Superconducting tunneling in single crystal thin films
[AD-743442] N72-32726
NORTHROP CORP., HAWTHORNE, CALIF.
Simulation and analysis in establishing flying qualities criteria
N72-32026
Preliminary design study for an advanced fighter type in-flight simulator
[AD-743970] N72-32282
NORTHWESTERN UNIV., EVANSTON, ILL.
Intrinsic studies of materials: Sintering mechanisms of defect oxides
[AD-744517] N72-32578

O

OAK RIDGE NATIONAL LAB., TENN.
Effect of neutron irradiation on the ductility of austenitic stainless steel
[CONF-720420-4] N72-32555
Proceedings of the Conference on Continuum Aspects of Graphite Design
[CONF-701105] N72-32572
Prospects for alternate fusion fuel cycles at ultra-high temperatures
[ORNL-TM-3783] N72-32651
Energetic particle beams and fusion devices
[ORNL-TM-3788] N72-32687
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS [FRANCE].
Choice of propulsion mode, part 1
N72-32750
Rocket propulsion, part 2
N72-32751
Statoreactors, Part 3
N72-32752
Aerodynamic problems, part 4
N72-32753
OFFICE OF NAVAL RESEARCH, ARLINGTON, VA.
Naval Research Reviews, June - July 1972
N72-32970
Naval Research Reviews, May 1972
N72-32971
OFFICE OF NAVAL RESEARCH, LONDON [ENGLAND].
New shock tube laboratory at Aachen, Germany
[AD-741191] N72-32269
OHIO STATE UNIV., COLUMBUS.
Coherent combining of angle modulated signals using phase lock loops
[AD-744085] N72-32202
OLD DOMINION UNIV., NORFOLK, VA.
A NASTRAN correlation study for vibrations of a cross-stiffened ship's deck
N72-32878
OWENS-ILLINOIS, INC., TOLEDO, OHIO.
Plasma display terminal
[AD-744096] N72-32069

P

PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION, BERKELEY, CALIF.
Inventory of forest and rangeland and detection of forest stress
[E72-10070] N72-32337
PARAMETRICS, INC., WALTHAM, MASS.
Laboratory investigation of absolute intensity constants of metallic and alkaline earth oxides by nonshock tube methods
[AD-744061] N72-32161
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Theoretical study of the ionospheric G factor
[NASA-CR-130059] N72-32391
Quantitative micro-luminescence and related studies of fine and/or glassy lunar surface materials
[NASA-CR-128534] N72-32805
PENNSYLVANIA UNIV., PHILADELPHIA.
Histopathology of argon laser-induced retinal lesions
[AD-741380] N72-32127
PHILCO-FORD CORP., WILLOWGROVE, PA.
Algorithms for transceiver modulation and demodulation
[AD-744082] N72-32201
PHOTOCHEM INDUSTRIES, INC., FAIRFIELD, N.J.
Atomic oxygen absorption cell system
[AD-744097] N72-32168
PLANNING RESEARCH CORP., HUNTSVILLE, ALA.
A method of hardware qualification for flight by analyses, similarity and integrated testing
[NASA-CR-123831] N72-32843
PLASMADYNE CORP., SANTA ANA, CALIF.
Quasi-steady plasma accelerators
[NASA-CR-112144] N72-32691
POLY-SCIENTIFIC DIV., LITTON PRECISION PRODUCTS, INC., BLACKSBURG, VA.
The synergistic effects of slip ring-brush design and materials
[NASA-CR-130063] N72-32230
POLYTECHNIC INST. OF BROOKLYN, N.Y.
Research of Aerophysics Institute for strategic technology
[AD-744533] N72-32713
PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Properties of materials in high pressure hydrogen at room and elevated temperatures
[NASA-CR-123829] N72-32145
PRINCETON UNIV., N.J.
Effects of turbulence instabilities on laser propagation
[AD-744099] N72-32535
Contribution of computer simulation to plasma theory
[MATT-894] N72-32704
A non-isothermal theory of an electrostatic probe in a weakly ionized gas
[AD-744100] N72-32710
PURDUE UNIV., LAFAYETTE, IND.
Spectroscopic study of the behavior of xenon behind a shock wave
[AD-744271] N72-32328
The optimum shaping of axisymmetric bodies for minimum drag in incompressible flow
[AD-744314] N72-32330
An interdisciplinary analysis of ERTS data for Colorado mountain environments using ADP Techniques
[E72-10081] N72-32340
Preliminary results on automatic identification of forest and agricultural cover types utilizing ERTS-1 data over the Wabash River Basin
[E72-10118] N72-32368
Determination of thermophysical properties at high temperatures by direct heating methods
[AD-743976] N72-32559

Q

QUANTRONIX CORP., SMITHTOWN, N.Y.
CW YAG laser techniques
[AD-743979] N72-32525

R

R AND D ASSOCIATES, SANTA MONICA, CALIF.
Historical climatology
[AD-744129] N72-32634
RADIATION RESEARCH ASSOCIATES, INC., FORT WORTH, TEX.
Analysis of radiation and meteoroid satellite data
[NASA-CR-128535] N72-32833
RADIATION, INC., MELBOURNE, FLA.
S-band microcircuit power amplifier
[NASA-CR-130062] N72-32228
RADIO CORP. OF AMERICA, LANCASTER, PA.
Development of a high voltage heat pipe thermionic module
[WASH-1199] N72-32952
RADIO CORP. OF AMERICA, PRINCETON, N.J.
Improving the efficiency of GaP LED's which emit green light
[NASA-CR-112111] N72-32719
RAND CORP., SANTA MONICA, CALIF.
Approaches to improved program validation through programming language design
[P-4865] N72-32210
An impossibility theorem for group probability functions
[P-4862] N72-32589
Systems analysis: A tool for choice
[P-4860] N72-32976
RAYTHEON CO., WAYLAND, MASS.
RADC imagery data base
[AD-744088] N72-32195
Pulse pair estimation of Doppler spectrum parameters
[AD-744094] N72-32200
REILLY TRANSLATIONS, GARDENA, CALIF.
A model of the radio emission of Uranus
[NASA-TT-F-14454] N72-32831
RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Linear Accelerator project
[COO-3058-11] N72-32268
Instabilities and turbulence in highly ionized plasmas in a magnetic field
[NASA-CR-128297] N72-32689
RESEARCH ANALYSIS CORP., MCLEAN, VA.
Transportation systems for military and civilian operations in northern regions
[AD-743990] N72-32284
RICE UNIV., HOUSTON, TEX.
Ionospheric heating analysis. HF plasma line enhancements at Arecibo
[AD-744523] N72-32446
ROCKETDYNE, CANOGA PARK, CALIF.
Engineering parameters study of nitrogen tetroxide flow decay
[AD-744110] N72-32745
ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
A detailed analytical and experimental investigation of an inclined end fire receiving rhombic antenna array
[AD-744091] N72-32249
ROYAL AERONAUTICAL SOCIETY, LONDON [ENGLAND].
Estimation of take-off distance
[EG-5/1-AMEND-A] N72-32014
ROYAL AIRCRAFT ESTABLISHMENT, BEDFORD [ENGLAND].
Aerodynamics at moderate hypersonic Mach numbers
N72-31995
Optimum shapes
N72-31996
Theory of waveriders
N72-31997
Thin shock layer theory
N72-31998

Momentum theory
N72-31999
Flows with heat addition
N72-32000
Turbulence models for the assessment of handling qualities during take off and landing
N72-32030

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH [ENGLAND].
Changes in the pulse frequency rhythm in relation to the workload
[RAE-LIB-TRANS-1586] N72-32092
Circadian variations in choice reaction time
[RAE-LIB-TRANS-1668] N72-32093
Oxygen diffusion in the brain. Part 2: Oxygen diffusion with O2 deficiency
[RAE-LIB-TRANS-1661] N72-32108
Ergonomics and its importance in the development of fighting vehicles
[RAE-LIB-TRANS-1658] N72-32136
The inhibition of the thermal discolouration of polyacrylonitrile, part 1
[RAE-LIB-TRANS-1593-[A]-PT-1]
N72-32146
The inhibition of the thermal discolouration of polyacrylonitrile, Part 2: Investigation into the inhibition mechanism
[RAE-LIB-TRANS-1593-[B]-PT-2]
N72-32147
A study of the diffusion of cathodic hydrogen in iron using the electrochemical detection technique
[RAE-I ¹B-TRANS-1667] N72-32150
Preliminary investigation into the tolerance of transistors to transients
[RAE-LIB-TRANS-1664] N72-32223
Electronic modules for astronautics. Part 2: Modules for the processing of experimental data
[RAE-LIB-TRANS-1645-PT-2] N72-32224
The part played by cavitation in the breakdown of solid bodies when these impinge on dorps
[RAE-LIB-TRANS-1655] N72-32298
The estimation of impulsive pressures arising in the impact of a drop against a solid surface
[RAE-LIB-TRANS-1653] N72-32299
The strength of materials under the action of droplet impacts
[RAE-LIB-TRANS-1654] N72-32307
The calculation of pressures in the collision of a drop with a plane
[RAE-LIB-TRANS-1652] N72-32308
Some tests on the intermittency effect
[RAE-LIB-TRANS-1595] N72-32461
Electrochemical studies on the cause of hydrogen-embrittlement by Zn-cyanide plating. Part 2: Studies of hydrogen-embrittlement of steel electrolytically plated by the zn cyanide process
[RAE-LIB-TRANS-1644-PT-2] N72-32496
Possibilities for thrust determination in an aircraft
[RAE-LIB-TRANS-1650] N72-32755
Contribution to judging the riding comfort of railway wagons
[RAE-LIB-TRANS-1630] N72-32965

ROYAL INST. OF TECH., STOCKHOLM [SWEDEN].
Experimental study of induced drag and leading edge tangential suction force spanwise distribution of thin plane delta wings at low speeds including the effects of fuselage diameter
[KTH-AERO-TN-58] N72-32011
Potential double layers in the ionosphere
[TRITA-EPP-71-14] N72-32420
Growth of a space charge sheath in a low density discharge plasma
[TRITA-EPP-71-20] N72-32697

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, KJELLER.
NORSAR research and development
[AD-740845] N72-32447

RUTHERFORD HIGH ENERGY LAB., CHILTON [ENGLAND].
Towards the design of superconducting magnets for a proton synchrotron
[RPP/A-88] N72-32661

S

SACLANT ASW RESEARCH CENTER, LA SPEZIA [ITALY].
An expansion technique for rendering the WKBJ method uniformly valid
[AD-742465] N72-32662

SANDIA LABS., ALBUQUERQUE, N.MEX.
Formulation of the equations of motion for flight vehicles with semipassive roll control systems
[SCL-RR-720007] N72-32049
Holography in a modern laboratory
[SC-DC-721230] N72-32524
Influence of microstructure on low temperature creep of Ti-5 Al-2.5 Sn
[SCL-RR-720227] N72-32554

SANDIA LABS., LIVERMORE, CALIF.
Characterization of flow geometries in flow control devices
[SCL-DR-710351] N72-32319

SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
Noise within fixed-wing utility aircraft used by the military
[AD-742772] N72-32052
Device for the determination of the stability of stance and the fine adjustments to body equilibrium
[AD-741265] N72-32128
Conversion of octave band noise data to equivalent A-weighted levels
[AD-744522] N72-32670

SCIENTIFIC RESEARCH INST. OF ELECTRO-PHYSICAL APPARATUS, LENINGRAD [USSR].
Theta-pinch in electron-hole plasma with surface generation
[NP-19269] N72-32699
Spectroscopic examination of the parameters of a turbulent plasma
[NP-19262] N72-32702

SCIENTIFIC TRANSLATION SERVICE, SANTA BARBARA, CALIF.
On the computation of the nose portion of a wing profile in sonic flow
[NASA-TT-F-14285] N72-32010
Problems of heat sterilization dynamics
[NASA-TT-F-14543] N72-32086
The terminal decontamination of rooms. Evaluation of efficacity check
[NASA-TT-F-14544] N72-32087
Vibration as a factor in increasing the effect of noise
[NASA-TT-F-14542] N72-32094
Pharamacological and physiological studies on the perspiration centers
[NASA-TT-F-14545] N72-32095
Regulatory mechanisms for fatty acid biosynthesis
[NASA-TT-F-14549] N72-32096
Toward knowledge of the effect of magnesium on the body temperature
[NASA-TT-F-14550] N72-32097
Human endurance of impact angular accelerations
[NASA-TT-F-14565] N72-32100
A study on the compression strength of human vertebrae
[NASA-TT-F-14566] N72-32101
Human endurance of brief [impact] overloads [the problem of selecting a mechanical model]
[NASA-TT-F-14571] N72-32102
Phonocardiogram analysis and electronic computers
[NASA-TT-F-14608] N72-32113
Computer analysis of phonocardiograms
[NASA-TT-F-14588] N72-32114
The conquest of outer space
[NASA-TT-F-14535] N72-32139
Oxidation of tungsten and molybdenum in oxygen atmospheres at low pressures and high temperatures
[NASA-TT-F-14559] N72-32148
Wind tunnel corrections for measurements of two-dimensional profiles in the transonic wind tunnel of the Aerodynamic Testing Facility Goettingen
[NASA-TT-F-14316] N72-32264
Supersonic flow in a corner formed by intersecting plates
[NASA-TT-F-14537] N72-32301
Subsonic and supersonic flow around nonaxisymmetric fuselages
[NASA-TT-F-14547] N72-32302
Flow control by cross jet
[NASA-TT-F-14548] N72-32303
What gravity tells us
[NASA-TT-F-14546] N72-32399
Human-like machines
[NASA-TT-F-14553] N72-32492
Automatic mechanical hands
[NASA-TT-F-14554] N72-32493
The daily course of energy within the air layer near the ground
[NASA-TT-F-14552] N72-32604
Acoustic wave excitation in a flame
[NASA-TT-F-14594] N72-32660
Applicability of the hydrodynamic approximation for a nonrelativistic plasma
[NASA-TT-F-14599] N72-32696
Optimization of structures with constraints on dynamic and frequency characteristics
[NASA-TT-F-14540] N72-32904
Direct calculation of sublimation ablation
[NASA-TT-F-14529] N72-32936
The effect of the start reaction H2 plus O2 yields 2OH on the time sequence of hydrogen combustion in the air
[NASA-TT-F-14555] N72-32940
Temperature stresses in an anisotropic cylinder
[NASA-TT-F-14528] N72-32943
Differential equations of the problem of thermal diffusion in a solid deformed isotropic body
[NASA-TT-F-14572] N72-32948
The space era: Society and nature
[NASA-TT-F-14517] N72-32978
The planet's first cosmonaut
[NASA-TT-F-14606] N72-32979

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Empirical techniques applied to large scale and long period air-sea interactions, a preliminary experiment
[AD-743864] N72-32436

SERVICE TECHNIQUE AERONAUTIQUE, PARIS [FRANCE].
Comparison of French and United States flying qualities requirements
N72-32018

SIA, INC., GLEN MORE, PA.
Space programming language machine architecture study, volume 1
[AD-743014] N72-32216
Space programming language machine architecture study. Volume 2: Appendices
[AD-743015] N72-32217

SIGNALS RESEARCH AND DEVELOPMENT ESTABLISHMENT, CHRISTCHURCH [ENGLAND].
Potential distributions in surface P-N junctions
[SRDE-71023] N72-32721

SMITHSONIAN INSTITUTION, WASHINGTON, D.C.
Feasibility study of an aerospace museum in the western United States. Volume 1: Summary, conclusions, and recommendations
[NASA-CR-127333] N72-32955
Feasibility study of an aerospace museum in the western United States. Volume 2: Documentation
[NASA-CR-127334] N72-32956

SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, TOULOUSE [FRANCE].
Influence of the design and functioning characteristics of the flying control system of a transport aircraft on its flight qualities
N72-32032

SOLAR AIRCRAFT CO., SAN DIEGO, CALIF.
Analytical, experimental and mechanical evaluation of free rotating vaneless diffusers
[AD-744475] N72-32771

SOUTHAMPTON UNIV. [ENGLAND].
Real gas effects on lifting reentry aerothermodynamics
N72-32003

SPACELABS, INC., CHATSWORTH, CALIF.
Biomedical ground lead system
[NASA-CR-128536] N72-32138

SPECTRAN, INC., HOLLYWOOD, CALIF.
Dial Pack dust cloud data analysis
[AD-744084] N72-32441

STANFORD UNIV., CALIF.
Optimal inputs for system identification
[NASA-CR-128173] N72-32257
Structural and lithologic study of northern coast range and Sacramento Valley, California
[E72-10074] N72-32338
Material nonlinearity effects in optimization considerations of stiffened cylinders and interpretation of test data scatter for compressive buckling
[AD-743951] N72-32921

STATE UNIV. OF NEW YORK, ALBANY.
Lake effect storm study
[PUBL-142] N72-32609

SYRACUSE UNIV., N.Y.
Project management in the Apollo program: An interdisciplinary study
[NASA-CR-126941] N72-32954

SYSTEMS CONTROL, INC., PALO ALTO, CALIF.
Analysis of instrumentation error effects on the identification accuracy of aircraft parameters
[NASA-CR-112121] N72-32040
SCIP2 flight instrumentation specification for parameter identification: User's guide
[NASA-CR-112122] N72-32041
Dual control and identification methods for avionic systems. Part 1: Dual control
[AD-744115] N72-32064
Dual control and identification methods for avionic systems. Part 2: Optimal inputs for linear system identification
[AD-744116] N72-32065

T

TECHNION - ISRAEL INST. OF TECH., HAIFA.
Generalized characteristics method for elastic wave propagation problems
[NASA-CR-128216] N72-32910

TECHNISCHE HOCHSCHULE MUNCHEN [WEST GERMANY].
Transport properties in high power arcs
[AD-744518] N72-32714

TECHNISCHE HOGESCHOOL, DELFT [NETHERLANDS].
Pilot vehicle analysis
N72-32034

TECHTRAN CORP., GLEN BURNIE, MD.
Prolonged action of medium intensity noise on the functional condition of an organism
[NASA-TT-F-14567] N72-32088
Effect of caffeine on athletic performance
[NASA-TT-F-14561] N72-32098
Compensation of alcohol effects by caffeine and pervitin in a psychomotor performance
[NASA-TT-F-14564] N72-32099
Intraperitoneal administration of a physiological solution as a supplementary method for hydration of an organism
[NASA-TT-F-14574] N72-32103

Ultrastructural localization of the alkaline phosphatase activity in the interrenal cells of the tailed amphibian Triturus cristatus
[NASA-TT-F-14577] N72-32104
The activity of collagenases and the collagen content of the skin during carcinogenesis
[NASA-TT-F-14579] N72-32105
Motion of a fluid bounded by a flexible film
[NASA-TT-F-14575] N72-32312
Rational calculation of laminar and turbulent compressible boundary layers with heat transfer
[NASA-TT-F-14578] N72-32313
Soil temperature conditions on a central Alpine slope on both sides of the timberline. Part 3: Soil temperature in relationship to other climatic factors
[NASA-TT-F-14323] N72-32398
Solution of certain boundary problems of mathematical physics by the collocation method
[NASA-TT-F-14371] N72-32586
Thermal capacity of a wall with a toroidal plasma inculsion
[NASA-TT-F-14367] N72-32693
A theory of calculation of flutter vibrations in subsonic flows
[NASA-TT-F-14576] N72-32905

TELEDYNE ADCOM, CAMBRIDGE, MASS.
Multipath error in range rate measurement by PLL-transponder/GRARR/TDRS
[NASA-CR-130054] N72-32177
Multipath signal model development
[NASA-CR-130055] N72-32178
Multipath performance of a TDRS system employing wideband FM VHF signals
[NASA-CR-122481] N72-32179
Modifications of the wideband FM TDRS system
[NASA-CR-130057] N72-32180
Multipath errors in range rate measurement by a TDRS/VHF - GRARR
[NASA-CR-130056] N72-32181
Sampled data channel filters
[AD-744089] N72-32248

TENNESSEE UNIV., KNOXVILLE.
Microstructural stability of thermal-mechanically treated austenitic stainless steels
[ORO-4044-2] N72-32556

TEXAS A&M RESEARCH FOUNDATION, COLLEGE STATION.
Evaluation of atmospheric transport and diffusion
[AD-744482] N72-32613

TEXAS A&M UNIV., COLLEGE STATION.
On the performance of infrared sensors in earth observations
[NASA-CR-128416] N72-32472
An explicit form of the Mie phase matrix for multiple scattering calculations in the I, Q, U, and V representation
[NASA-CR-128174] N72-32775

TEXAS UNIV., AUSTIN.
Nonlinear estimation theory applied to orbit determination
[NASA-CR-127326] N72-32807

TRANSLATION CONSULTANTS, LTD., ARLINGTON, VA.
The p-type-GaAs[1-x]Px] n-type-GaAs heterojunction solar cells
[NASA-TT-F-14592] N72-32075
Physiological changes during prolonged bed rest
[NASA-TT-F-14342] N72-32085
The question of the effect of cumulative vertical vibration and noise on a series of protein, fat, and carbohydrate metabolism indices for warm-blooded animals
[NASA-TT-F-14569] N72-32090
Investigation of the interrelationship between the brain's bioelectric and its oxygen demand under vibration effects
[NASA-TT-F-14570] N72-32091
Study of the resistance to infection of pregnant women by the lymphoblastic transformation test
[NASA-TT-F-14591] N72-32106
Dangers of bed rest
[NASA-TT-F-14349] N72-32116
Turbulent flows with elastic boundaries
[NASA-TT-F-14601] N72-32304
Heat balance of agricultural soils
[NASA-TT-F-14511] N72-32393
Selene
[NASA-TT-F-14513] N72-32394
A determination of the displacements, angles of contact, stresses, and bending moments in radial-thrust bearings
[NASA-TT-F-14556] N72-32497
The amount of cosmic material falling upon the earth
[NASA-TT-F-14507] N72-32809

TRINITY COLL., DUBLIN [IRELAND].
Automation in ground surveys, with particular reference to the determination of elevation
[AD-743995] N72-32435

TRW, INC., CLEVELAND, OHIO.
Development of alloy for cast air-cooled turbine blades
[AD-744109] N72-32567

TYCO LABS., INC., WALTHAM, MASS.
Thick film silicon growth techniques
[NASA-CR-128415] N72-32718

U

UNION CARBIDE CORP., BOUND BROOK, N.J.
Hydrocarbon polymeric binder for advanced solid propellant
[NASA-CR-128300] N72-32743
Hydrocarbon polymeric binder for advanced solid propellant
[NASA-CR-128414] N72-32767

UNITED TECHNOLOGY CENTER, SUNNYVALE, CALIF.
Characterization of wire-wound tungsten composite
[AD-743978] N72-32575

UNIVERSITY COLL., LONDON [ENGLAND].
Determination of air density, temperature and winds at high altitude
[AD-742325] N72-32611

V

VIRGINIA POLYTECHNIC INST., BLACKSBURG.
An assessment of factors influencing data obtained by the photoelastic stress freezing technique for stress fields near crack tips
[AD-742662] N72-32915

W

WALTER E. FERNALD STATE SCHOOL, WAVERLY, MASS.
Concurrent schedule control of human eye movement behavior
[AD-741397] N72-32134

WASHINGTON UNIV., SEATTLE.
Propagation and reception of partially coherent waves in random media
[AD-743833] N72-32194

WAYNE STATE UNIV., DETROIT, MICH.
Studies of atmospheric processes
[AD-744081] N72-32633

WEATHER WING [4TH], ENT AFB, COLO.
A comparison of two techniques used to develop a computer generated map type catalog
[AD-744102] N72-32638

WEATHER WING [5TH], LANGLEY AFB, VA.
The use of wind stratified conditional climatology tables
[AD-744521] N72-32637

WESTENHOFF AND NOVICK, INC., CHICAGO, ILL.
Analysis and design of on-grade reinforced concrete track support structures
N72-32875

WESTINGHOUSE ELECTRIC CORP., BALTIMORE, MD.
Binary addressable scan-conversion storage tube
[AD-742521] N72-32237

WESTINGHOUSE RESEARCH LABS., PITTSBURGH, PA.
Paramagnetic resonance studies of Y2O3, CeO2, and ThO2
[AD-744516] N72-32733

WHITE SANDS MISSILE RANGE, N.MEX.
The 13001 Honest John Laser, missile no. 141, round no. 618 ROL [29 March 1972]
[AD-743839] N72-32618
The 13401 Honest John, missile no. 352, round no. 620 RML
[AD-743840] N72-32619

WHITELEY INDUSTRIES, INC., WILMINGTON, MASS.
Power generating subcomponent/fuel cell module
[AD-744477] N72-32078

WISCONSIN UNIV., MADISON.
A priori bounds for some bifurcation problems in fluid dynamics
[AD-744330] N72-32329
Solution of a dual problem in optimal control theory 1
[AD-743795] N72-32595
Multidisciplinary studies of the social, economic and political impact resulting from recent advances in satellite meteorology, volume 1
[NASA-CR-127335] N72-32974
Multidisciplinary studies of the social, economic and political impact resulting from recent advances in satellite meteorology, volume 2
[NASA-CR-127336] N72-32975

WOLF RESEARCH AND DEVELOPMENT CORP., RIVERDALE, MD.
The 136 MHZ/400 MHz earth station antenna-noise temperature prediction program for RAE-B
[NASA-TM-X-66047] N72-32184
The interdependence of lake ice and climate in central North America
[E72-10121] N72-32371

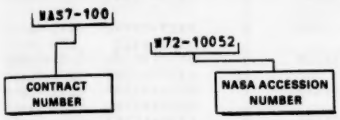
WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Notes on the 1971 Summer study program in geophysical fluid dynamics at the Woods Hole Oceanographic Institution. Volume 1: Course, Lectures and abstracts of seminars
[PB-208567] N72-32430
Notes on the 1971 Summer study program in geophysical fluid dynamics at the Woods Hole Oceanographic Institution. Volume 2: Fellowship lectures
[PB-208568] N72-32431

WORLD AIRWAYS, INC., OAKLAND, CALIF.
Charters, the new mode: Setting a new course for international air transportation
N72-32983
Minimum transportation regulation maximizes tourism's contribution to economic growth
N72-32984

WYOMING UNIV., LARAMIE.
Analysis of ERTS-1 imagery of Wyoming and its application to evaluation of Wyoming's natural resources
[E72-10079] N72-32339

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number, the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. 672A
N72-32216
N72-32217
AF PROJ. 0001
N72-32438
AF PROJ. 1123
N72-32142
AF PROJ. 1347
N72-32062
AF PROJ. 1426
N72-32486
AF PROJ. 1467
N72-32483
AF PROJ. 3066
N72-32756
N72-32768
AF PROJ. 3145
N72-32326
AF PROJ. 3170
N72-32058
AF PROJ. 4608
N72-32732
AF PROJ. 4610
N72-32191
AF PROJ. 4643
N72-32434
N72-32792
AF PROJ. 5621
N72-32730
AF PROJ. 5635
N72-32199
N72-32250
N72-32261
N72-32664
AF PROJ. 5791
N72-32244
AF PROJ. 6040
N72-32773
AF PROJ. 6065
N72-32063
AF PROJ. 6672
N72-32200
AF PROJ. 6688
N72-32793
AF PROJ. 6698
N72-32635
AF PROJ. 7021
N72-32733
AF PROJ. 7063
N72-32712
N72-32714
AF PROJ. 7064
N72-32710
AF PROJ. 7065
N72-32756
AF PROJ. 7071
N72-32594
AF PROJ. 7073
N72-32666
AF PROJ. 7312
N72-32567
AF PROJ. 7340
N72-32582
AF PROJ. 7343
N72-32505
N72-32509
N72-32511
N72-32512
N72-32513
N72-32558
N72-32647
N72-32734
N72-32770
N72-32925
AF PROJ. 7351
N72-32514
AF PROJ. 7360
N72-32166
AF PROJ. 7381
N72-32559
AF PROJ. 7628
N72-32646
AF PROJ. 7649
N72-32790
AF PROJ. 7659
N72-32251
AF PROJ. 7661
N72-32424
N72-32439
N72-32440
AF PROJ. 7670
N72-32445
AF PROJ. 7755
N72-32052
N72-32670
AF PROJ. 7885
N72-32240
AF PROJ. 8219
N72-32066
N72-32068
N72-32282
AF PROJ. 8605
N72-32611
AF PROJ. 8608
N72-32161
AF PROJ. 8624
N72-32624
AF PROJ. 8627
N72-32168
AF PROJ. 8682
N72-32194
AF PROJ. 8687
N72-32724
AF PROJ. 9560
N72-32738
AF PROJ. 9752
N72-32709
AF PROJ. 9763
N72-32731
AF PROJ. 9764
N72-32726
AF PROJ. 9768
N72-32144
N72-32668
AF PROJ. 9769
N72-32064
N72-32065
AF PROJ. 9782
N72-32067
N72-32581
AF 29(601)-7097
N72-32244
AF-AFOSR-1241-67
N72-32726
AF-AFOSR-1865-70
N72-32144
AF-AFOSR-1941-70
N72-32639
AF-AFOSR-2233-72
N72-32807
APRA ORDER 2100
N72-32432
ARO PROJ. RW5139
N72-32768
ARO PROJ. RWC856
N72-32484
N72-32769
ARO PROJ. RW2116
N72-32484
N72-32769
ARO PROJ. RW2216
N72-32484
ARPA ORDER 306
N72-32537
ARPA ORDER 0236
N72-32565
ARPA ORDER 1060
N72-32724
ARPA ORDER 1279
N72-32535
ARPA ORDER 1423
N72-32446
ARPA ORDER 1434
N72-32534
ARPA ORDER 1442
N72-32713
ARPA ORDER 1559
N72-32189
ARPA ORDER 1615
N72-32429
ARPA ORDER 1774
N72-32443
ARPA ORDER 1856
N72-32633
ARPA ORDER 1964
N72-32634
ARPA PROJ. 0236
N72-32564
AT(11-1)-GEN-14
N72-32421
AT(11-1)-1478
N72-32705
AT(11-1)-3058
N72-32268
AT(11-1)-3073
N72-32704
AT(11-1)-3077
N72-32707
AT(26-1)-171 N72-32422
AT(29-1)-789 N72-32049
N72-32319
N72-32554
AT(30-1)-4161
N72-32952
AT(40-1)-4044
N72-32556
AT(45-1)-1830
N72-32123
N72-32141
N72-32259
CG PROJ. 726414
N72-32425
CPA-22-69-137
N72-32048
DA PROJ. 1B0-62116-A-084
N72-32285
N72-32285
DA PROJ. 1B2-62301-A-208
N72-32196
DA PROJ. 1B6-22706-A-102
N72-32631
DA PROJ. 1F0-61102-A-33F
N72-32921
DA PROJ. 1F1-62203-A-119
N72-32245
DA PROJ. 1F1-62203-A-143
N72-32053
N72-32054
DA PROJ. 1F1-62203-A-170
N72-32580
DA PROJ. 1G1-62203-D-144
N72-32507
DA PROJ. 1G6-63702-DG-11
N72-32771
DA PROJ. 1H6-64705-D-511
N72-32626
DA PROJ. 1S6-62705-A-055
N72-32532
DA PROJ. 1T0-61102-B-53-A
N72-32632
DA PROJ. 1T0-61101-A-91-A
N72-32241
N72-32255
DA PROJ. 1T0-61102-B-53-A
N72-32437
N72-32527
N72-32530
N72-32627
DA PROJ. 1T6-65702-D-127
N72-32619
N72-32620
N72-32621
N72-32622
N72-32623
DA PROJ. 1T6-65702-D-127-02
N72-32618
DA PROJ. 1W6-62710-A-D-29
N72-32163
DA PROJ. 3A0-62110-A-819
N72-32119
N72-32120
N72-32476
N72-32579
N72-32649
DA PROJ. 4A0-61102-A-859
N72-32281
DA-ARO(D)-31-124-71-G15
N72-32774
DA-ARO(D)-31-124-71-G124
N72-32568
DA-ERO-591-71-G0006
N72-32444
DA-ERO-591-71-G0008
N72-32435
DA-31-124-ARO(D)-400
N72-32536
DA-31-124-ARO(D)-462
N72-32329
N72-32595
DA-44-009-AMC-787(T)
N72-32077
DA-49-083-OSA-3131
N72-32920
DA-49-146-XZ-574
N72-32737
DAAB07-68-C-0381
N72-32613
DAAB07-70-C-0136
N72-32078
DAAB07-70-C-0296
N72-32532
DAAB07-70-C-0312
N72-32525
DAAB07-71-C-0090
N72-32245
DAAB07-71-C-0325
N72-32242
DAAB07-72-C-0023
N72-32253
DAAB07-72-C-0052
N72-32237
DAAF07-69-C-0444
N72-32915
DAAG39-70-C-0058
N72-32196
DAAJ01-70-C-0171
N72-32503
DAAJ02-70-C-0039
N72-32053
N72-32054
DAAJ02-70-C-0068
N72-32507
DAAJ02-70-C-0075
N72-32921
DAAJ02-71-C-0056
N72-32580

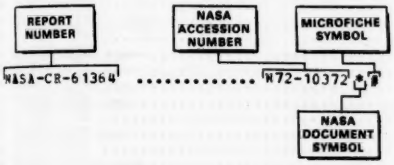
DAAK02-71-C-0189 N72-32771
DADA17-70-C-0011 N72-32127
DADA17-70-G-9317 N72-32134
DAHC04-67-C-0009 N72-32578
DAHC04-68-C-0002 N72-32508
DAHC04-68-C-0041 N72-32669
DAHC04-69-C-0069 N72-32740
DAHC04-69-C-0070 N72-32562
DAHC04-69-C-0077 N72-32713
DAHC04-69-C-0091 N72-32739
DAHC04-71-C-0015 N72-32125
DAHC15-67-C-0219 N72-32735
DAHC15-71-C-0253 N72-32564 N72-32565
DAHC19-69-C-0017 N72-32284
DAJA37-71-C-3347 N72-32612
DASA01-68-C-0114 N72-32557
DOT-FA69WAI-166 N72-32648
DOT-FA71WAI-234 N72-32137
DOT-FA71WA1-232 N72-32131
FAA PROJ. 213-621 N72-32643
FAA PROJ. 215-721-01X N72-32937
F04611-71-C-0034 N72-32745
F04701-70-C-0159 N72-32918
F04701-71-C-0172 N72-32162 N72-32480 N72-32531 N72-32859
F04701-71-C-0200 N72-32216 N72-32217
F19628-68-C-0058 N72-32724
F19628-68-C-0239 N72-32793
F19628-68-C-0243 N72-32238
F19628-69-C-0077 N72-32790
F19628-69-C-0123 N72-32194
F19628-69-C-0172 N72-32161
F19628-69-C-0177 N72-32251
F19628-70-C-0018 N72-32250
F19628-70-C-0098 N72-32732
F19628-70-C-0212 N72-32424 N72-32440
F19628-70-C-0230 N72-32137 N72-32189 N72-32722
F19628-70-C-0252 N72-32168
F19628-70-C-0283 N72-32447
F19628-71-C-0073 N72-32635
F19628-71-C-0114 N72-32434
F19628-71-C-0126 N72-32200
F19628-72-C-0007 N72-32633
F29601-68-C-0089 N72-32244
F30602-69-C-0112 N72-32202
F30602-70-C-0052 N72-32201
F30602-70-C-0165 N72-32195
F30602-71-C-0009 N72-32218
F30602-71-C-0107 N72-32215
F30602-71-C-0155 N72-32446
F30602-71-C-0212 N72-32248
F30602-71-C-0272 N72-32069
F30602-71-C-0297 N72-32441
F30602-71-C-0356 N72-32535
F30602-72-C-0183 N72-32239
F33615-68-C-1221 N72-32058
F33615-68-C-1227 N72-32063
F33615-68-C-1681 N72-32733
F33615-69-C-1661 N72-32567
F33615-70-C-1021 N72-32166
F33615-70-C-1244 N72-32710
F33615-70-C-1484 N72-32575
F33615-71-C-1058 N72-32068
F33615-71-C-1075 N72-32280
F33615-71-C-1182 N72-32563
F33615-71-C-1183 N72-32559
F33615-71-C-1366 N72-32282
F33615-71-C-1509 N72-32165 N72-32953
F33615-71-C-1751 N72-32756
F33615-72-C-1049 N72-32279
F33657-71-D-0057 N72-32773
F40600-72-C-0003 N72-32484 N72-32768 N72-32769
F44620-67-C-0019 N72-32067
F44620-69-C-0011 N72-32738
F44620-69-C-0114 N72-32143
F44620-70-C-0020 N72-32581
F44620-70-C-0087 N72-32709
F44620-71-C-0048 N72-32668
F44620-71-C-0055 N72-32731
F44620-71-C-0077 N72-32064 N72-32065
F44620-71-C-0082 N72-32443
F44620-72-C-0025 N72-32634
F61052-57-C-0081 N72-32714
F61052-68-C-0057 N72-32611
F61052-69-C-0014 N72-32445
GS-00-DS-(P)-94008 N72-32548
HDL PROJ. E05E3 N72-32241
HDL PROJ. 16114 N72-32196
HDL PROJ. 31100 N72-32320
IITRI PROJ. E6221 N72-32239
ILIR PROJ. 5-7 N72-32251
ILIR-00-01 N72-32791
JPL ORDER GU-561461 N72-32117
JPL-951210 N72-32743 N72-32767
JPL-953210 N72-32766
JPL-953365 N72-32718
KS/7/0638/C.B.43(A)2 N72-32574
MF12524005 N72-32061
MRI PROJ. 3430-D N72-32174
NASA ORDER A-64460-A N72-32518
NASA ORDER S-70251-AG N72-32337
NASW-2030 N72-32174
NASW-2035 N72-32010 N72-32086 N72-32087 N72-32094 N72-32095 N72-32096 N72-32097 N72-32100 N72-32101 N72-32102 N72-32113 N72-32114 N72-32139 N72-32148 N72-32301 N72-32302 N72-32303 N72-32399 N72-32492 N72-32493 N72-32604 N72-32660 N72-32696 N72-32904 N72-32936 N72-32940 N72-32943 N72-32948 N72-32978 N72-32979
NASW-2037 N72-32088 N72-32098 N72-32099 N72-32103 N72-32104 N72-32105 N72-32312 N72-32313 N72-32398 N72-32586 N72-32693 N72-32905
NASW-2038 N72-32075 N72-32085 N72-32090 N72-32091 N72-32106 N72-32116 N72-32304 N72-32393 N72-32394 N72-32497 N72-32809
NASW-2215 N72-32955 N72-32956
NASW-2224 N72-31993
NAS1-8151 N72-32071
NAS1-9474 N72-32761
NAS1-10155 N72-32849
NAS1-10193 N72-32297
NAS1-10630 N72-32691
NAS1-10696 N72-32719
NAS1-10717 N72-32115
NAS1-10791 N72-32040 N72-32041
NAS1-10990 N72-32847
NAS2-6722 N72-32206
NAS3-14376 N72-32502
NAS3-15341 N72-32495
NAS5-9328 N72-32813
NAS5-9334 N72-32390
NAS5-10797 N72-32177 N72-32178 N72-32179 N72-32180 N72-32181
NAS5-11402 N72-32786
NAS5-11790 N72-32401
NAS5-20197 N72-32228
NAS5-21146 N72-32230
NAS5-21761 N72-32371
NAS5-21772 N72-32341
NAS5-21799 N72-32339
NAS5-21822 N72-32374
NAS5-21826 N72-32388
NAS5-21880 N72-32340
NAS7-100 N72-32070 N72-32151 N72-32154 N72-32209 N72-32232 N72-32498 N72-32718 N72-32743 N72-32766 N72-32767 N72-32826 N72-32892 N72-32910
NAS8-15140 N72-32842
NAS8-21298 N72-32221
NAS8-21809 N72-32231
NAS8-21811 N72-32843
NAS8-25055 N72-32690
NAS8-25590 N72-32490
NAS8-26191 N72-32145
NAS8-26773 N72-32690
NAS8-26972 N72-32844
NAS8-27048 N72-32845
NAS8-28231 N72-32415
NAS8-29039 N72-32172
NAS9-4065 N72-32641
NAS9-11155 N72-32472
NAS9-11442 N72-32138
NAS9-11655 N72-32211
NAS9-11903 N72-32833
NAS9-12068 N72-32795 N72-32796 N72-32797 N72-32798 N72-32799 N72-32800 N72-32801 N72-32802 N72-32803 N72-32804
NAS9-12777 N72-32587
NAS10-7788 N72-32491
NGL-01-008-001 N72-32846
NGL-04-001-007 N72-32454
NGL-05-002-069 N72-32794 N72-32806
NGL-05-020-007 N72-32257
NGL-06-004-078 N72-32957
NGL-21-002-033 N72-32782
NGL-22-009-124 N72-32639
NGL-33-022-090 N72-32954

NGL-39-009-003 N72-32391
NGL-44-012-008 N72-32807
NGL-50-002-114 N72-32974 N72-32975
NGR-05-003-458 N72-32455
NGR-05-003-0471 N72-32016
NGR-05-009-083 N72-32081
NGR-05-020-526 N72-32257
NGR-06-002-075 N72-32083
NGR-09-005-007 N72-32463
NGR-09-050-001 N72-32463
NGR-16-002-038 N72-32296
NGR-21-002-003 N72-32082
NGR-21-002-066 N72-32776
NGR-21-002-344 N72-32938
NGR-22-007-176 N72-32585
NGR-33-016-131 N72-32933
NGR-33-018-137 N72-32689
NGR-39-009-095 N72-32391
NGR-39-009-183 N72-32805
NGR-44-001-001 N72-32472
NGR-44-001-117 N72-32775
NGR-50-002-116 N72-32716
NONR-1224(36) N72-32190
NONR-3718(01) N72-32723
NONR-3835(00) N72-32537
NONR-4864(00) N72-32260
NR PROJ. 014-112 N72-32167
NR PROJ. 017-308 N72-32735
NR PROJ. 021-109 N72-32789
NR PROJ. 032-498 N72-32576
NR PROJ. 032-508 N72-32741
NR PROJ. 041-423 N72-32330
NR PROJ. 049-207 N72-32260
NR PROJ. 064-031 N72-32926
NR PROJ. 064-388 N72-32254
NR PROJ. 083-603 N72-32423
NR PROJ. 187-200 N72-32190
NR PROJ. 387-057 N72-32485
NSF GF-280 N72-32609
NSF GP-8748 N72-32671 N72-32674 N72-32675
NSF GS-999 N72-32110
NSF GU-2061 N72-32671
NSF GZ-1494 N72-32430 N72-32431
N00014-66-C-0154 N72-32917
N00014-66-C-0190 N72-32576
N00014-67-A-0027 N72-32254
N00014-67-A-0094-0020 N72-32926
N00014-67-A-0128-0004 N72-32329
N00014-67-A-0191-0006 N72-32930
N00014-67-A-0191-0007 N72-32236 N72-32914
N00014-67-A-0204-0002 N72-32919
N00014-67-A-0204-0010 N72-32727
N00014-67-A-0226-0005 N72-32328
N00014-67-A-0226-0012 N72-32330
N00014-67-A-0298-0012 N72-32735
N00014-67-A-0298-0016 N72-32167
N00014-67-A-0404-0003 N72-32741
N00014-68-A-0158 N72-32728
N00014-69-A-0200-1040 N72-32789
N00014-69-A-0200-6006 N72-32436
N00014-70-A-0016-0001 N72-32423
N00014-70-A-0235-0001 N72-32723
N00014-71-A-0430-0002 N72-32432
N00014-71-C-0026 N72-32129
N00014-71-C-0296 N72-32485
N00014-71-C-0421 N72-32260
N00019-70-C-073 N72-32526
N00019-71-C-0065 N72-32526
OE-C-0-71-4433(357) N72-32980
ORA PROJ. 073430 N72-32705
PRO-Y-71-872 N72-32199 N72-32261
PROJ. APOLLO N72-32641
PROJ. DEFENDER N72-32537
PROJ. SQUID N72-32328
PROJ. THEMIS N72-32915
PROJ. TO-61102-A-33-B N72-32320
PROJ. 160-080 N72-32910
PROJ. 6730-MC N72-32578
SCI PROJ. 5971 N72-32064 N72-32065
SP35433008 N72-32323
SR0140301 N72-32324
W-31-109-ENG-38 N72-32140
W-7405-ENG-26 N72-32572 N72-32651 N72-32687
W-7405-ENG-36 N72-32267 N72-32479 N72-32521 N72-32573
W-7405-ENG-48 N72-32160 N72-32706
YF38534002 N72-32916
112-02 N72-32673
112-02-20-01-00-21 N72-32317
112-27 N72-32072
112-28 N72-32764
117-07-04-01 N72-32855
117-07-04-11-21 N72-32474
160-44-51-01-51 N72-32462
195-42-51-02 N72-32570
491-01 N72-32856
501-06-08-01 N72-32318
501-17-01-06 N72-32044
501-21 N72-32212 N72-32547
501-22-01-01 N72-32867
501-24 N72-32949 N72-32950
501-38-12-02 N72-32045
502-01 N72-32571
502-27-02-01 N72-32300
502-32-04-04 N72-32911
503-10 N72-32155 N72-32590 N72-32695
503-10-04-01 N72-32679
503-25 N72-32549 N72-32650
741-72 N72-32765
764-74 N72-32939
790-91-42-01 N72-32834
815-20-04-06 N72-32853
914-13-00-72 N72-32848
914-50-20-17-72 N72-32857
924-23-26-00-72 N72-32852

REPORT/ACCESSION NUMBER INDEX

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS VOLUME 10 NUMBER 23

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche. A plus sign (+) indicates a document that can not be microfiched but for which one-to-one facsimile is available.

A-4456 ..... N72-32474*#
A-4509 ..... N72-32317*#

A/V-70208-7 ..... N72-32919 #

ACC-72-5 ..... N72-32330 #

ACIC-TC-1818 ..... N72-32428 #
ACIC-TC-1819 ..... N72-32427 #

AD-728823 ..... N72-32120 #
AD-740233 ..... N72-32789 #
AD-740605 ..... N72-32215 #
AD-740637 ..... N72-32188 #
AD-740845 ..... N72-32447 #
AD-741176 ..... N72-32143 #
AD-741191 ..... N72-32269 #
AD-741198 ..... N72-32917 #
AD-741217 ..... N72-32557 #
AD-741265 ..... N72-32128 #
AD-741354 ..... N72-32429 #
AD-741368 ..... N72-32281 #
AD-741377 ..... N72-32053 #
AD-741380 ..... N72-32127 #
AD-741397 ..... N72-32134 #
AD-741686 ..... N72-32131 #
AD-741747 ..... N72-32142 #
AD-741750 ..... N72-32791 #
AD-741781 ..... N72-32594 #
AD-741783 ..... N72-32790 #
AD-741827 ..... N72-32617 #
AD-741828 ..... N72-32125 #
AD-741857 ..... N72-32278 #
AD-741860 ..... N72-32428 #
AD-741861 ..... N72-32427 #
AD-741882 ..... N72-32612 #
AD-742093 ..... N72-32280 #
AD-742096 ..... N72-32279 #
AD-742107 ..... N72-32442 #
AD-742235 ..... N72-32792 #
AD-742247 ..... N72-32054 #
AD-742276 ..... N72-32130 #
AD-742325 ..... N72-32611 #
AD-742337 ..... N72-32916 #
AD-742342 ..... N72-32423 #
AD-742409 ..... N72-32133 #
AD-742431 ..... N72-32132 #
AD-742465 ..... N72-32662 #
AD-742513 ..... N72-32126 #
AD-742521 ..... N72-32237 #
AD-742603 ..... N72-32722 #
AD-742638 ..... N72-32124 #
AD-742639 ..... N72-32708 #
AD-742653 ..... N72-32425 #
AD-742655 ..... N72-32503 #
AD-742659 ..... N72-32426 #
AD-742662 ..... N72-32915 #
AD-742780 ..... N72-32055 #
AD-742945 ..... N72-32615 #
AD-742972 ..... N72-32052 #
AD-743014 ..... N72-32216 #
AD-743015 ..... N72-32217 #
AD-743042 ..... N72-32726 #
AD-743045 ..... N72-32631 #
AD-743453 ..... N72-32163 #
AD-743454 ..... N72-32285 #
AD-743456 ..... N72-32627 #
AD-743457 ..... N72-32626 #
AD-743459 ..... N72-32530 #
AD-743468 ..... N72-32241 #
AD-743469 ..... N72-32577 #
AD-743476 ..... N72-32050 #
AD-743477 ..... N72-32059 #
AD-743478 ..... N72-32060 #
AD-743479 ..... N72-32323 #
AD-743483 ..... N72-32061 #
AD-743484 ..... N72-32744 #
AD-743485 ..... N72-32727 #
AD-743488 ..... N72-32614 #
AD-743489 ..... N72-32324 #
AD-743560 ..... N72-32192 #
AD-743566 ..... N72-32529 #
AD-743567 ..... N72-32528 #
AD-743569 ..... N72-32596 #
AD-743579 ..... N72-32322 #
AD-743591 ..... N72-32077 #
AD-743612 ..... N72-32057 #
AD-743635 ..... N72-32645 #
AD-743742 ..... N72-32193 #
AD-743748 ..... N72-32630 #
AD-743760 ..... N72-32629 #
AD-743763 ..... N72-32628 #
AD-743766 ..... N72-32433 #
AD-743768 ..... N72-32283 #
AD-743795 ..... N72-32595 #
AD-743800 ..... N72-32320 #
AD-743825 ..... N72-32558 #
AD-743828 ..... N72-32663 #
AD-743829 ..... N72-32056 #
AD-743831 ..... N72-32624 #
AD-743832 ..... N72-32646 #
AD-743833 ..... N72-32194 #
AD-743834 ..... N72-32724 #
AD-743835 ..... N72-32793 #
AD-743838 ..... N72-32480 #
AD-743839 ..... N72-32618 #
AD-743840 ..... N72-32619 #
AD-743841 ..... N72-32620 #
AD-743842 ..... N72-32621 #
AD-743843 ..... N72-32622 #
AD-743844 ..... N72-32623 #
AD-743850 ..... N72-32527 #
AD-743860 ..... N72-32191 #
AD-743861 ..... N72-32664 #
AD-743863 ..... N72-32625 #
AD-743864 ..... N72-32436 #
AD-743865 ..... N72-32919 #
AD-743867 ..... N72-32432 #
AD-743897 ..... N72-32859 #
AD-743898 ..... N72-32918 #
AD-743950 ..... N72-32434 #
AD-743951 ..... N72-32921 #
AD-743952 ..... N72-32424 #
AD-743956 ..... N72-32243 #
AD-743968 ..... N72-32058 #
AD-743970 ..... N72-32282 #
AD-743976 ..... N72-32559 #
AD-743978 ..... N72-32575 #
AD-743979 ..... N72-32525 #
AD-743980 ..... N72-32741 #
AD-743984 ..... N72-32914 #
AD-743985 ..... N72-32236 #
AD-743987 ..... N72-32725 #
AD-743990 ..... N72-32284 #
AD-743991 ..... N72-32920 #
AD-743994 ..... N72-32244 #
AD-743995 ..... N72-32435 #

AD-743996 ..... N72-32242 #
AD-743999 ..... N72-32531 #
AD-744009 ..... N72-32144 #
AD-744018 ..... N72-32239 #
AD-744024 ..... N72-32190 #
AD-744042 ..... N72-32616 #
AD-744046 ..... N72-32162 #
AD-744047 ..... N72-32576 #
AD-744048 ..... N72-32768 #
AD-744049 ..... N72-32189 #
AD-744050 ..... N72-32504 #
AD-744053 ..... N72-32129 #
AD-744056 ..... N72-32240 #
AD-744061 ..... N72-32161 #
AD-744064 ..... N72-32238 #
AD-744065 ..... N72-32723 #
AD-744072 ..... N72-32526 #
AD-744074 ..... N72-32439 #
AD-744075 ..... N72-32534 #
AD-744076 ..... N72-32730 #
AD-744077 ..... N72-32438 #
AD-744078 ..... N72-32199 #
AD-744079 ..... N72-32261 #
AD-744081 ..... N72-32633 #
AD-744082 ..... N72-32201 #
AD-744084 ..... N72-32441 #
AD-744085 ..... N72-32202 #
AD-744086 ..... N72-32218 #
AD-744087 ..... N72-32445 #
AD-744088 ..... N72-32195 #
AD-744089 ..... N72-32248 #
AD-744090 ..... N72-32440 #
AD-744091 ..... N72-32249 #
AD-744092 ..... N72-32250 #
AD-744093 ..... N72-32732 #
AD-744094 ..... N72-32200 #
AD-744095 ..... N72-32251 #
AD-744096 ..... N72-32069 #
AD-744097 ..... N72-32168 #
AD-744098 ..... N72-32635 #
AD-744099 ..... N72-32535 #
AD-744100 ..... N72-32710 #
AD-744102 ..... N72-32638 #
AD-744103 ..... N72-32063 #
AD-744104 ..... N72-32066 #
AD-744106 ..... N72-32582 #
AD-744107 ..... N72-32166 #
AD-744109 ..... N72-32567 #
AD-744110 ..... N72-32745 #
AD-744113 ..... N72-32581 #
AD-744114 ..... N72-32067 #
AD-744115 ..... N72-32064 #
AD-744116 ..... N72-32065 #
AD-744122 ..... N72-32668 #
AD-744127 ..... N72-32738 #
AD-744129 ..... N72-32634 #
AD-744130 ..... N72-32443 #
AD-744131 ..... N72-32731 #
AD-744138 ..... N72-32924 #
AD-744140 ..... N72-32922 #
AD-744141 ..... N72-32505 #
AD-744143 ..... N72-32325 #
AD-744148 ..... N72-32923 #
AD-744150 ..... N72-32647 #
AD-744151 ..... N72-32560 #
AD-744153 ..... N72-32561 #
AD-744154 ..... N72-32481 #
AD-744155 ..... N72-32665 #
AD-744156 ..... N72-32214 #
AD-744157 ..... N72-32321 #
AD-744159 ..... N72-32051 #
AD-744172 ..... N72-32841 #
AD-744173 ..... N72-32246 #
AD-744174 ..... N72-32666 #
AD-744177 ..... N72-32931 #
AD-744178 ..... N72-32486 #
AD-744182 ..... N72-32513 #
AD-744183 ..... N72-32773 #
AD-744184 ..... N72-32636 #
AD-744185 ..... N72-32514 #
AD-744190 ..... N72-32583 #
AD-744204 ..... N72-32564 #
AD-744205 ..... N72-32565 #
AD-744211 ..... N72-32198 #
AD-744212 ..... N72-32930 #
AD-744225 ..... N72-32537 #
AD-744230 ..... N72-32709 #
AD-744238 ..... N72-32331 #
AD-744240 ..... N72-32729 #

AD-744241 ..... N72-32197 #
AD-744242 ..... N72-32286 #
AD-744249 ..... N72-32736 #
AD-744251 ..... N72-32164 #
AD-744252 ..... N72-32928 #
AD-744253 ..... N72-32929 #
AD-744254 ..... N72-32079 #
AD-744255 ..... N72-32566 #
AD-744256 ..... N72-32506 #
AD-744261 ..... N72-32925 #
AD-744263 ..... N72-32563 #
AD-744264 ..... N72-32509 #
AD-744265 ..... N72-32770 #
AD-744269 ..... N72-32219 #
AD-744271 ..... N72-32328 #
AD-744278 ..... N72-32734 #
AD-744280 ..... N72-32062 #
AD-744285 ..... N72-32667 #
AD-744289 ..... N72-32510 #
AD-744293 ..... N72-32511 #
AD-744294 ..... N72-32512 #
AD-744297 ..... N72-32772 #
AD-744301 ..... N72-32711 #
AD-744311 ..... N72-32167 #
AD-744312 ..... N72-32254 #
AD-744314 ..... N72-32330 #
AD-744319 ..... N72-32735 #
AD-744330 ..... N72-32329 #
AD-744332 ..... N72-32485 #
AD-744338 ..... N72-32737 #
AD-744343 ..... N72-32728 #
AD-744344 ..... N72-32260 #
AD-744346 ..... N72-32926 #
AD-744347 ..... N72-32444 #
AD-744435 ..... N72-32255 #
AD-744453 ..... N72-32579 #
AD-744469 ..... N72-32247 #
AD-744470 ..... N72-32437 #
AD-744472 ..... N72-32632 #
AD-744474 ..... N72-32253 #
AD-744475 ..... N72-32771 #
AD-744476 ..... N72-32245 #
AD-744477 ..... N72-32078 #
AD-744480 ..... N72-32532 #
AD-744481 ..... N72-32648 #
AD-744482 ..... N72-32613 #
AD-744483 ..... N72-32196 #
AD-744489 ..... N72-32533 #
AD-744490 ..... N72-32483 #
AD-744491 ..... N72-32068 #
AD-744493 ..... N72-32953 #
AD-744494 ..... N72-32165 #
AD-744495 ..... N72-32927 #
AD-744500 ..... N72-32669 #
AD-744503 ..... N72-32756 #
AD-744504 ..... N72-32507 #
AD-744505 ..... N72-32580 #
AD-744509 ..... N72-32326 #
AD-744510 ..... N72-32252 #
AD-744511 ..... N72-32482 #
AD-744512 ..... N72-32327 #
AD-744513 ..... N72-32484 #
AD-744514 ..... N72-32769 #
AD-744516 ..... N72-32733 #
AD-744517 ..... N72-32578 #
AD-744518 ..... N72-32714 #
AD-744519 ..... N72-32562 #
AD-744520 ..... N72-32712 #
AD-744521 ..... N72-32637 #
AD-744522 ..... N72-32670 #
AD-744523 ..... N72-32446 #
AD-744524 ..... N72-32740 #
AD-744525 ..... N72-32739 #
AD-744529 ..... N72-32508 #
AD-744531 ..... N72-32568 #
AD-744532 ..... N72-32536 #
AD-744533 ..... N72-32713 #
AD-744535 ..... N72-32774 #
AD-744808 ..... N72-32119 #
AD-745118 ..... N72-32476 #
AD-745119 ..... N72-32649 #

AE-MK-271 ..... N72-32158 #

AECL-PAK/LIB-34 ..... N72-32076 #

AEDC-TR-72-19 ..... N72-32484 #
AEDC-TR-72-64-PT-1 ..... N72-32768 #
AEDC-TR-72-89 ..... N72-32769 #

AERO-S.00.03.12 ..... N72-32293

AERO-W.S.01.03.03.06 ..... N72-31991
AERO-W.S.08.01.02 ..... N72-31991
AERO-W.01.01.01 ..... N72-31991

AEWES-MISC-PAPER-S-72-7 ..... N72-32281 #

AFAPL-TR-72-3 ..... N72-32326 #
AFAPL-TR-72-43-VOL-2 ..... N72-32756 #

AFCRL-AFSIG-238 ..... N72-32624 #

AFCRL-ERP-381 ..... N72-32791 #
AFCRL-ERP-390 ..... N72-32438 #
AFCRL-ERP-395 ..... N72-32646 #
AFCRL-ERP-398 ..... N72-32439 #

AFCRL-IP-176 ..... N72-32625 #

AFCRL-PSRP-479 ..... N72-32792 #
AFCRL-PSRP-482 ..... N72-32664 #
AFCRL-PSRP-485 ..... N72-32730 #
AFCRL-PSRP-488 ..... N72-32534 #

AFCRL-71-0281 ..... N72-32251 #
AFCRL-72-0036 ..... N72-32194 #
AFCRL-72-0049 ..... N72-32791 #
AFCRL-72-0073 ..... N72-32199 #
AFCRL-72-0075 ..... N72-32724 #
AFCRL-72-0081 ..... N72-32624 #
AFCRL-72-0090 ..... N72-32792 #
AFCRL-72-0094 ..... N72-32790 #
AFCRL-72-0095 ..... N72-32238 #
AFCRL-72-0115 ..... N72-32191 #
AFCRL-72-0124 ..... N72-32633 #
AFCRL-72-0133 ..... N72-32793 #
AFCRL-72-0134 ..... N72-32261 #
AFCRL-72-0171 ..... N72-32438 #
AFCRL-72-0187 ..... N72-32664 #
AFCRL-72-0188 ..... N72-32646 #
AFCRL-72-0191 ..... N72-32161 #
AFCRL-72-0222 ..... N72-32200 #
AFCRL-72-0225 ..... N72-32730 #
AFCRL-72-0228 ..... N72-32625 #
AFCRL-72-0233 ..... N72-32534 #
AFCRL-72-0239 ..... N72-32440 #
AFCRL-72-0241 ..... N72-32424 #
AFCRL-72-0249 ..... N72-32168 #
AFCRL-72-0251 ..... N72-32434 #
AFCRL-72-0257 ..... N72-32732 #
AFCRL-72-0259 ..... N72-32439 #
AFCRL-72-0260 ..... N72-32635 #
AFCRL-72-0268 ..... N72-32611 #
AFCRL-72-0271 ..... N72-32250 #
AFCRL-72-0299 ..... N72-32445 #

AFFDL-TM-72-01-FEM ..... N72-32056 #

AFFDL-TR-71-127 ..... N72-32058 #
AFFDL-TR-71-149 ..... N72-32282 #
AFFDL-TR-71-152 ..... N72-32068 #
AFFDL-TR-71-175 ..... N72-32063 #
AFFDL-TR-72-5 ..... N72-32483 #
AFFDL-TR-72-20 ..... N72-32533 #
AFFDL-TR-72-44 ..... N72-32066 #

AFHRL-TR-71-50 ..... N72-32142 #

AFML-TR-71-245 ..... N72-32575 #
AFML-TR-71-274 ..... N72-32582 #
AFML-TR-71-280 ..... N72-32166 #
AFML-TR-72-9 ..... N72-32559 #
AFML-TR-72-28 ..... N72-32567 #

AFOSR-72-0322TR ..... N72-32581 #
AFOSR-72-0808TR ..... N72-32067 #
AFOSR-72-0963TR ..... N72-32726 #
AFOSR-72-0983TR ..... N72-32143 #
AFOSR-72-0997TR ..... N72-32738 #
AFOSR-72-1186TR-PT-1 ..... N72-32064 #
AFOSR-72-1187TR-PT-2 ..... N72-32065 #
AFOSR-72-1188TR ..... N72-32668 #
AFOSR-72-1200TR ..... N72-32709 #
AFOSR-72-1211TR ..... N72-32731 #
AFOSR-72-1214TR ..... N72-32634 #
AFOSR-72-1215TR ..... N72-32443 #
AFOSR-72-1216TR ..... N72-32144 #

AFRPL-TR-72-38 ..... N72-32745 #

AFWL-TR-71-160 ..... N72-32244 #

AGARD-AR-39 ..... N72-32457 #

AGARD-CP-106 ..... N72-32017 #

AGARD-LS-42-VOL-1 ..... N72-31994 #
AGARD-LS-42-VOL-2 ..... N72-32749 #

AMRL-1038 ..... N72-32807*#

ANL-7860-PT-2 ..... N72-32140 #

APS-ME-65 ..... N72-32858 #

AR-1 ..... N72-32985 #
AR-2 ..... N72-32145*#
AR-4 ..... N72-32957*#
AR-6 ..... N72-32685 #

ARA-80 ..... N72-32709 #

ARL-72-0019-PT-4 ..... N72-32594 #
ARL-72-0026 ..... N72-32733 #
ARL-72-0046 ..... N72-32240 #
ARL-72-0060 ..... N72-32710 #
ARL-72-0070 ..... N72-32714 #
ARL-72-0073 ..... N72-32712 #

ARL/A-NOTE-335 ..... N72-32309 #
ARL/INST-76 ..... N72-32517 #
ARL/ME-134 ..... N72-32311 #
ARL/MET-78 ..... N72-32539 #
ARL/MET-81 ..... N72-32468 #
ARL/SM-336 ..... N72-32907 #

ARO-ETF-TR-71-228 ..... N72-32484 #
ARO-ETF-TR-72-29-PT-1 ..... N72-32768 #
ARO-ETF-TR-72-68 ..... N72-32769 #

AROD-T-1-90-RT ..... N72-32508 #

AROD-5415-19-P ..... N72-32536 #
AROD-6730-7-MC ..... N72-32578 #
AROD-7893-11-P ..... N72-32669 #
AROD-8156-10-MC ..... N72-32562 #
AROD-8511-21-P ..... N72-32740 #
AROD-8595-16-P ..... N72-32739 #
AROD-8677-26-P ..... N72-32713 #
AROD-10223-1-E ..... N72-32774 #

ARPA-TR-43 ..... N72-32735 #

ASE-3066 ..... N72-32784 #

ASL-72-A ..... N72-32434 #

ASRL-TR-144-6 ..... N72-32067 #
ASRL-TR-162-2 ..... N72-32581 #

AT-7330-OT ..... N72-32183 #

AU-648-PT-4 ..... N72-32039 #

AVSD-0022-72-CR ..... N72-32953 #
AVSD-0152-72-CR ..... N72-32165 #

AWS-MANUAL-105-8-VOL-3 ..... N72-32617 #

AWS-TR-200-REV ..... N72-32616 #

BAC-8654-953003 ..... N72-32502*#

BBC-1972/25 ..... N72-32170
BBC-1972/28 ..... N72-32171

BC-8845-FAB ..... N72-32766*#

BCL-72.2 ..... N72-32144 #

BM-TPR-59 ..... N72-32659 #

BMI-171-135 ..... N72-32422 #

BMPR-1 ..... N72-32262*#
BMPR-1 ..... N72-32376*#

BMPR-1 ..... N72-32377*#
BMPR-1 ..... N72-32378*#
BMPR-1 ..... N72-32379*#
BMPR-1 ..... N72-32380*#
BMPR-1 ..... N72-32381*#
BMPR-1 ..... N72-32382*#
BMPR-1 ..... N72-32383*#
BMPR-1 ..... N72-32384*#
BMPR-1 ..... N72-32385*#
BMPR-1 ..... N72-32386*#

BNWL-SA-4121 ..... N72-32123 #
BNWL-SA-4231 ..... N72-32141 #

BNWL-1596 ..... N72-32259 #

BR-27075 ..... N72-32721 #
BR-29692 ..... N72-32965 #
BR-31024 ..... N72-32308 #
BR-31025 ..... N72-32307 #
BR-31114 ..... N72-32150 #
BR-31115 ..... N72-32136 #
BR-31284 ..... N72-32093 #

BR30134 ..... N72-32188 #

BULL-44 ..... N72-32265 #

CEA-CONF-1944 ..... N72-32233 #

CEA-R-3597 ..... N72-32593 #
CEA-R-4164 ..... N72-32187 #
CEA-R-4273 ..... N72-32523 #

CERN-72-5 ..... N72-32235 #

CIRAD-WS-10300-2-VOL-1 ..... N72-32216 #
CIRAD-WS-10300-2-VOL-2 ..... N72-32217 #

CONF-700503-12 ..... N72-32661 #
CONF-701105 ..... N72-32572 #
CONF-710543-2 ..... N72-32233 #
CONF-710807-2 ..... N72-32788 #
CONF-710905-5 ..... N72-32553 #
CONF-720210-1 ..... N72-32160 #
CONF-720312-8 ..... N72-32478 #
CONF-720318-1 ..... N72-32159 #
CONF-720411-3 ..... N72-32123 #
CONF-720420-4 ..... N72-32555 #
CONF-720422-1 ..... N72-32524 #
CONF-720423-1 ..... N72-32704 #
CONF-720508-1 ..... N72-32141 #

CONTRIB-2104 ..... N72-32794*#

COO-1478-10 ..... N72-32705 #
COO-3058-11 ..... N72-32268 #

CRC-1220 ..... N72-32176 #

CRREL-SR-165-SUPPL ..... N72-32429 #

CW-WR-69-114F ..... N72-32503 #

D-MAT-173 ..... N72-32574 #

DASA-2501-6 ..... N72-32557 #

DC-TR-1212-1 ..... N72-32440 #
DC-TR-1212-2 ..... N72-32424 #

DDC-TAS-70-41-1 ..... N72-32504 #
DDC-TAS-72-4421 ..... N72-32504 #

DLR-MITT-71-19 ..... N72-32934*#

DNA-2837(T) ..... N72-32737 #

DR-705 ..... N72-32623 #
DR-706 ..... N72-32618 #
DR-707-REV ..... N72-32621 #
DR-708 ..... N72-32622 #
DR-710 ..... N72-32619 #
DR-714 ..... N72-32620 #

DRI-2604 ..... N72-32957*#

DRIC-TRANS-2759 ..... N72-32188 #
DRIC-TRANS-2779 ..... N72-32772 #

D180-14257-1 ..... N72-32580 #
D180-15000-1 ..... N72-32731 #
D210-10207-2 ..... N72-32053 #
D210-10207-3 ..... N72-32054 #

E-6408 ..... N72-32856*#
E-6666 ..... N72-32759*#
E-6738 ..... N72-32673*#
E-6850 ..... N72-32072*#
E-6860 ..... N72-32939*#
E-6897 ..... N72-32571*#
E-6907 ..... N72-32541*#
E-6933 ..... N72-32547*#
E-6934 ..... N72-32205*#
E-6948 ..... N72-32949*#
E-6976 ..... N72-32495*#
E-6988 ..... N72-32549*#
E-6989 ..... N72-32650*#
E-7001 ..... N72-32212*#
E-7003 ..... N72-32695*#
E-7008 ..... N72-32765*#
E-7013 ..... N72-32764*#
E-7015 ..... N72-32950*#
E-7058 ..... N72-32590*#
E-7061 ..... N72-32155*#
E-7072 ..... N72-32542*#
E-7089 ..... N72-32458*#
E-7092 ..... N72-32715*#
E-7099 ..... N72-32652*#
E-7100 ..... N72-32310*#
E-7118 ..... N72-32754*#
E-7121 ..... N72-32762*#
E-7123 ..... N72-32043*#
E-7137 ..... N72-32182*#
E-7167 ..... N72-32763*#

EA-TR-4636 ..... N72-32285 #
EA-TR-4642 ..... N72-32163 #
EA-TR-4648 ..... N72-32631 #

ECOM-C-0052-1 ..... N72-32237 #

ECOM-0023-1 ..... N72-32253 #
ECOM-0090-2 ..... N72-32245 #
ECOM-0136-F ..... N72-32078 #
ECOM-0296-F ..... N72-32532 #
ECOM-0312-F ..... N72-32525 #
ECOM-0325-F ..... N72-32242 #
ECOM-0381-7 ..... N72-32613 #
ECOM-3573 ..... N72-32247 #
ECOM-5421 ..... N72-32627 #
ECOM-5428 ..... N72-32437 #
ECOM-5432 ..... N72-32530 #
ECOM-5433 ..... N72-32527 #
ECOM-5434 ..... N72-32632 #

EE-196(72)ONR-005 ..... N72-32728 #

EF/TN/A/48 ..... N72-32944 #

EFI-ME-1(71) ..... N72-32684 #

EG-5/1-AMEND-A N72-32014

ELR-4227 ..... N72-32271 #
ELR-4228 ..... N72-32274 #
ELR-4295 ..... N72-32276 #
ELR-4329 ..... N72-32275 #
ELR-4332 ..... N72-32273 #
ELR-4333 ..... N72-32270 #
ELR-4334 ..... N72-32272 #

ER-2391 ..... N72-32771 #
ER-7398 ..... N72-32567 #

ERU-433 ..... N72-32277 #

ESD-TR-72-92 ..... N72-32722 #
ESD-TR-72-103 ..... N72-32189 #
ESD-TR-72-143 ..... N72-32447 #

ESDU-AERO-A.06.01.06 ..... N72-31992
ESDU-AERO-A.07.01.02 ..... N72-31988

ESDU-FAT-L.01.01 ..... N72-32015

ESDU-STRUCT-02.01.25 ..... N72-32861

ESDU-01.00.03 ..... N72-32864
ESDU-01.01.16 ..... N72-32863
ESDU-02.01.40 ..... N72-32865
ESDU-7009 ..... N72-32294
ESDU-66021 ..... N72-32862
ESDU-67013 ..... N72-32866
ESDU-69001 ..... N72-32866
ESDU-69005 ..... N72-32584
ESDU-69006 ..... N72-32748
ESDU-69007 ..... N72-32747
ESDU-69008 ..... N72-32746
ESDU-69013 ..... N72-31989
ESDU-69023-AMEND-B N72-32015
ESDU-70006 ..... N72-31992
ESDU-70008 ..... N72-32290
ESDU-70010 ..... N72-32293
ESDU-70011 ..... N72-31991
ESDU-70012 ..... N72-31990
ESDU-70013-PT-1 ..... N72-32292
ESDU-70014-PT-2 ..... N72-32291
ESDU-70015 ..... N72-32295
ESDU-71014 ..... N72-32861
ESDU-71015 ..... N72-32860
ESDU-71016 ..... N72-32288
ESDU-71017 ..... N72-31988
ESDU-71018 ..... N72-32289
ESDU-71026-PT-2 ..... N72-32013
ESDU-72005 ..... N72-32862

ESL-P-466 ..... N72-32639*#

ESL-TM213-VOL-1 ..... N72-32490*#

ESL-2738-7 ..... N72-32202 #

EUR-CEA-FC-627 ..... N72-32703 #

E72-10060 ..... N72-32333*#
E72-10061 ..... N72-32334*#
E72-10062 ..... N72-32335*#
E72-10064 ..... N72-32336*#
E72-10070 ..... N72-32337*#
E72-10074 ..... N72-32338*#
E72-10079 ..... N72-32339*#
E72-10081 ..... N72-32340*#
E72-10088 ..... N72-32341*#
E72-10089 ..... N72-32342*#
E72-10090 ..... N72-32343*#
E72-10091 ..... N72-32344*#
E72-10092 ..... N72-32345*#
E72-10093 ..... N72-32346*#
E72-10094 ..... N72-32347*#
E72-10095 ..... N72-32348*#
E72-10096 ..... N72-32349*#
E72-10097 ..... N72-32350*#
E72-10098 ..... N72-32351*#
E72-10099 ..... N72-32352*#
E72-10100 ..... N72-32353*#
E72-10101 ..... N72-32354*#
E72-10102 ..... N72-32355*#
E72-10103 ..... N72-32356*#
E72-10104 ..... N72-32357*#
E72-10105 ..... N72-32489*#
E72-10106 ..... N72-32358*#
E72-10107 ..... N72-32359*#
E72-10108 ..... N72-32360*#
E72-10109 ..... N72-32361*#
E72-10110 ..... N72-32362*#
E72-10111 ..... N72-32363*#
E72-10113 ..... N72-32364*#
E72-10114 ..... N72-32365*#
E72-10115 ..... N72-32366*#
E72-10116 ..... N72-32367*#
E72-10118 ..... N72-32368*#
E72-10119 ..... N72-32369*#
E72-10120 ..... N72-32370*#
E72-10121 ..... N72-32371*#
E72-10122 ..... N72-32372*#
E72-10123 ..... N72-32373*#
E72-10124 ..... N72-32453*#
E72-10125 ..... N72-32203*#
E72-10126 ..... N72-32374*#
E72-10127 ..... N72-32375*#
E72-10128 ..... N72-32376*#
E72-10129 ..... N72-32377*#
E72-10130 ..... N72-32378*#
E72-10131 ..... N72-32379*#
E72-10132 ..... N72-32380*#
E72-10133 ..... N72-32381*#
E72-10134 ..... N72-32382*#
E72-10135 ..... N72-32383*#
E72-10136 ..... N72-32384*#
E72-10137 ..... N72-32385*#
E72-10138 ..... N72-32386*#
E72-10139 ..... N72-32262*#
E72-10140 ..... N72-32387*#
E72-10141 ..... N72-32388*#
E72-10142 ..... N72-32389*#

FA-R-2032 ..... N72-32255 #

FAA-AM-72-24 ..... N72-32121 #

FAA-ED-01-1 ..... N72-32645 #

FAA-EM-72-3 ..... N72-32137 #

FAA-NA-72-49 ..... N72-32937 #

FAA-RD-71-19 ..... N72-32648 #
FAA-RD-72-75 ..... N72-32937 #

FEC-CTC-5051 ..... N72-32605*#

FIRL-F-C2864 ..... N72-32507 #

FOA-4-C-4379-29 ..... N72-32223 #

FR-72-14-686 ..... N72-32253 #
FR-062-10630 ..... N72-32691*#

FS-I-1 ..... N72-32337*#

FSTC-HT-23-349-72 ..... N72-32126 #
FSTC-HT-23-848-71 ..... N72-32596 #
FSTC-HT-23-1043-70 ..... N72-32708 #
FSTC-HT-23-1044-71 ..... N72-32322 #
FSTC-HT-23-1135-72 ..... N72-32927 #
FSTC-HT-23-1417-72 ..... N72-32252 #
FSTC-HT-23-1428-72 ..... N72-32482 #
FSTC-HT-23-1498-72 ..... N72-32327 #

FTD-HC-23-9-72 ..... N72-32925 #
FTD-HC-23-69-72 ..... N72-32923 #
FTD-HC-23-95-72 ..... N72-32563 #
FTD-HC-23-110-72 ..... N72-32509 #
FTD-HC-23-111-72 ..... N72-32770 #
FTD-HC-23-112-72 ..... N72-32511 #
FTD-HC-23-124-72 ..... N72-32512 #
FTD-HC-23-142-72 ..... N72-32647 #
FTD-HC-23-147-72 ..... N72-32560 #
FTD-HC-23-191-72 ..... N72-32055 #
FTD-HC-23-288-71 ..... N72-32558 #
FTD-HC-23-325-71 ..... N72-32133 #
FTD-HC-23-754-71 ..... N72-32773 #
FTD-HC-23-1563-71 ..... N72-32583 #
FTD-HC-23-1786-71 ..... N72-32736 #
FTD-HC-23-1794-71 ..... N72-32924 #
FTD-HC-23-1795-71 ..... N72-32164 #
FTD-HC-23-1798-71 ..... N72-32922 #
FTD-HC-23-1804-71 ..... N72-32928 #
FTD-HC-23-1805-71 ..... N72-32931 #
FTD-HC-23-1810-71 ..... N72-32929 #
FTD-HC-23-1813-71 ..... N72-32079 #
FTD-HC-23-1814-71 ..... N72-32505 #
FTD-HC-23-1846-71 ..... N72-32510 #
FTD-HC-23-1881-71 ..... N72-32566 #
FTD-HC-23-1999-71 ..... N72-32506 #
FTD-HC-23-2091-71 ..... N72-32325 #

FTD-HT-23-404-72 ..... N72-32514 #
FTD-HT-23-965-70 ..... N72-32124 #
FTD-HT-23-971-71 ..... N72-32663 #
FTD-HT-23-1099-71 ..... N72-32561 #
FTD-HT-23-1195-71 ..... N72-32481 #
FTD-HT-23-1196-71 ..... N72-32665 #
FTD-HT-23-1250-71 ..... N72-32214 #
FTD-HT-23-1277-71 ..... N72-32321 #
FTD-HT-23-1285-71 ..... N72-32711 #
FTD-HT-23-1366-71 ..... N72-32219 #
FTD-HT-23-1491-71 ..... N72-32051 #
FTD-HT-23-1559-71 ..... N72-32246 #

FTD-MT-24-1166-71 ..... N72-32486 #
FTD-MT-24-1230-71 ..... N72-32734 #
FTD-MT-24-1234-71 ..... N72-32666 #
FTD-MT-24-1449-71 ..... N72-32636 #

FTD-MT-24-1454-71 ..... N72-32062 #
FTD-MT-24-1816-71 ..... N72-32841 #
FTD-MT-24-1819-71 ..... N72-32667 #

FTD-24-1182-71 ..... N72-32513 #

FTL-R71-2 ..... N72-32644 #

F00042FR ..... N72-32068 #

G-161-2 ..... N72-32179*#
G-161-4 ..... N72-32177*#
G-161-5 ..... N72-32181*#
G-161-9 ..... N72-32180*#
G-161F ..... N72-32178*#
G-179FR ..... N72-32248 #
G-1052 ..... N72-32608*#
G-1062 ..... N72-32462*#

GDC-632-3-134 ..... N72-32844*#

GDCA-DFH72-005 ..... N72-32845*#

GE/EE/72-19 ..... N72-32132 #

GEP/PH/72-4 ..... N72-32192 #
GEP/PH/72-10 ..... N72-32528 #

GLA-479 ..... N72-32221*#

GNE/PH/72-7 ..... N72-32529 #
GNE/PH/72-11 ..... N72-32725 #

GSA/MA/71-18 ..... N72-32057 #

H-REPT-92-1452 ..... N72-32967 #

H-SER-5924-VOL-1 ..... N72-32215 #

HDL-TM-72-11 ..... N72-32241 #

HDL-TR-1495-REV-B ..... N72-32320 #

HEL-TM-10-72 ..... N72-32125 #
HEL-TM-11-72 ..... N72-32130 #

HIG-71-19 ..... N72-32423 #

HP-28 ..... N72-32735 #

HRB-4567-R-2 ..... N72-32485 #

I-ARA-72-U-67 ..... N72-32709 #

INR-P-1367 ..... N72-32951 #

INR-1345 ..... N72-32686 #

IPP-IV-10 ..... N72-32522 #

IPP-1/124 ..... N72-32698 #

IPPT-132 ..... N72-32694 #

IS-2773 ..... N72-32553 #

ITR-7 ..... N72-32202 #

J-3 ..... N72-32460*#

JINR-P-917 ..... N72-32711 #

JINR-P8-6260 ..... N72-32720 #
JINR-P9-6252 ..... N72-32266 #
JINR-P13-6231 ..... N72-32234 #
JINR-P13-6261 ..... N72-32477 #

JPL-TR-32-1562 ..... N72-32070*#
JPL-TR-32-1572 ..... N72-32232*#

JPRS-51660 ..... N72-32107 #
JPRS-56024 ..... N72-32392 #
JPPS-56073 ..... N72-32084 #
JPRS-56916 ..... N72-32653 #
JPRS-56925 ..... N72-32175 #
JPRS-56928 ..... N72-32814 #
JPRS-56944 ..... N72-32815 #
JPRS-56959 ..... N72-32305 #
JPRS-57017 ..... N72-32306 #

JPRS-57018 ..... N72-32499 #
JPRS-57019 ..... N72-32816 #
JPRS-57027 ..... N72-32208 #
JPRS-57028 ..... N72-32467 #
JPRS-57029 ..... N72-32516 #
JPRS-57031 ..... N72-32640 #
JPRS-57043 ..... N72-32149 #
JPRS-57062-1-PT-1 ..... N72-32757 #
JPRS-57062-2-PT-2 ..... N72-32758 #
JPRS-57075 ..... N72-32912 #
JPRS-57100 ..... N72-32005 #
JPRS-57102 ..... N72-32186 #
JPRS-57138 ..... N72-32551 #

KFK-1512 ..... N72-32552 #

KFKI-71-79 ..... N72-32788 #

KHFTI-71-22 ..... N72-32700 #

KSC-TM-626-VOL-2 ..... N72-32135*#

KSC-TR-1178 ..... N72-32818*#

KTH-AERO-TM-58 ..... N72-32011 #

L-8134 ..... N72-32853*#
L-8143 ..... N72-32834*#
L-8361 ..... N72-32300*#
L-8369 ..... N72-32679*#
L-8389 ..... N72-32911*#
L-8409 ..... N72-32318*#
L-8426 ..... N72-32044*#
L-8485 ..... N72-32045*#
L-8553 ..... N72-32867*#
L-8595 ..... N72-32855*#

LA-4858-VOL-1 ..... N72-32521 #
LA-4899 ..... N72-32267 #
LA-4921 ..... N72-32573 #
LA-4937 ..... N72-32479 #

LBL-497 ..... N72-32160 #

LC-73-608985 ..... N72-32968 #

LGR-ER-11411 ..... N72-32058 #

LIB/TRANS-366 ..... N72-32122 #

LMSC/D266900 ..... N72-32390*#

LR-561 ..... N72-32310 #

MA-129TB ..... N72-32211*#

MATH-RES-9 ..... N72-32903 #

MATT-894 ..... N72-32704 #

MCR-72-198 ..... N72-32172*#

MDC-G2709-BK-1 ..... N72-32918 #
MDC-G2717 ..... N72-32842*#
MDC-G2826 ..... N72-32115*#

MF-65 ..... N72-32707 #

MRC-TSR-1187 ..... N72-32595 #
MRC-TSR-1221 ..... N72-32329 #

MSC-S-301 ..... N72-32857*#
MSC-S-337 ..... N72-32848*#
MSC-S-352 ..... N72-32587*#

MSC-1-MRD-001E-VOL-2 ..... N72-32808*#
MSC-309 ..... N72-32852*#
MSC-04482-APP-A ..... N72-32801*#
MSC-04482-APP-B ..... N72-32802*#
MSC-04482-APP-C ..... N72-32803*#
MSC-04482-VOL-1 ..... N72-32795*#
MSC-04482-VOL-2-PT-1 ..... N72-32796*#
MSC-04482-VOL-2-PT-2 ..... N72-32797*#
MSC-04482-VOL-2-PT-3 ..... N72-32798*#
MSC-04482-VOL-2-PT-4 ..... N72-32799*#
MSC-04482-VOL-3 ..... N72-32800*#
MSC-04483 ..... N72-32804*#

MSL-70-23-VOL-6 ..... N72-32557 #

M75-2/4 ..... N72-32448

NADC-CS-7133 ..... N72-32131 #

NADC-72021-VT ..... N72-32050 #
NADC-72043-VT ..... N72-32059 #
NADC-72047-VT ..... N72-32060 #

NAL-TR-239 ..... N72-32936*#

NAMRL-1161 ..... N72-32061 #

NASA-CASE-LAR-10541-1 ..... N72-32487*

NASA-CASE-LEW-11118-1 ..... N72-32501*#
NASA-CASE-LEW-11388-1 ..... N72-32500*#
NASA-CASE-LEW-11646-1 ..... N72-32760*#

NASA-CASE-MFS-15162 ..... N72-32452*
NASA-CASE-MFS-20589 ..... N72-32688*

NASA-CASE-NPO-11361 ..... N72-32169*
NASA-CASE-NPO-11417 ..... N72-32498*#

NASA-CASE-XLE-2529-3 ..... N72-32229*#

NASA-CR-2112 ..... N72-32938*#
NASA-CR-2113 ..... N72-32495*#
NASA-CR-2119 ..... N72-32587*#
NASA-CR-2123 ..... N72-32297*#
NASA-CR-2134 ..... N72-32296*#
NASA-CR-61393 ..... N72-32846*#
NASA-CR-61398 ..... N72-32415*#
NASA-CR-68614 ..... N72-32135*#
NASA-CR-112018 ..... N72-32115*#
NASA-CR-112047 ..... N72-32933*#
NASA-CR-112111 ..... N72-32719*#
NASA-CR-112121 ..... N72-32040*#
NASA-CR-112122 ..... N72-32041*#
NASA-CR-112123 ..... N72-32847*#
NASA-CR-112139 ..... N72-32071*#
NASA-CR-112144 ..... N72-32691*#
NASA-CR-112145 ..... N72-32849*#
NASA-CR-112150 ..... N72-32761*#
NASA-CR-114486 ..... N72-32206*#
NASA-CR-115721 ..... N72-32796*#
NASA-CR-115722 ..... N72-32797*#
NASA-CR-115723 ..... N72-32798*#
NASA-CR-115724 ..... N72-32799*#
NASA-CR-115725 ..... N72-32800*#
NASA-CR-115726 ..... N72-32804*#
NASA-CR-115727 ..... N72-32801*#
NASA-CR-120980 ..... N72-32502*#
NASA-CR-122479 ..... N72-32390*#
NASA-CR-122481 ..... N72-32179*#
NASA-CR-123759 ..... N72-32842*#
NASA-CR-123814 ..... N72-32490*#
NASA-CR-123815 ..... N72-32221*#
NASA-CR-123825 ..... N72-32172*#
NASA-CR-123826 ..... N72-32844*#
NASA-CR-123829 ..... N72-32145*#
NASA-CR-123830 ..... N72-32690*#
NASA-CR-123831 ..... N72-32843*#
NASA-CR-123837 ..... N72-32845*#
NASA-CR-125693 ..... N72-32794*#
NASA-CR-126941 ..... N72-32954*#
NASA-CR-127326 ..... N72-32807*#
NASA-CR-127333 ..... N72-32955*#
NASA-CR-127334 ..... N72-32956*#
NASA-CR-127335 ..... N72-32974*#
NASA-CR-127336 ..... N72-32975*#
NASA-CR-128080 ..... N72-32336*#
NASA-CR-128085 ..... N72-32337*#
NASA-CR-128089 ..... N72-32338*#
NASA-CR-128094 ..... N72-32339*#
NASA-CR-128096 ..... N72-32340*#
NASA-CR-128134 ..... N72-32333*#
NASA-CR-128135 ..... N72-32334*#
NASA-CR-128136 ..... N72-32335*#
NASA-CR-128137 ..... N72-32341*#
NASA-CR-128138 ..... N72-32342*#
NASA-CR-128139 ..... N72-32343*#
NASA-CR-128140 ..... N72-32344*#
NASA-CR-128141 ..... N72-32345*#
NASA-CR-128142 ..... N72-32346*#
NASA-CR-128143 ..... N72-32347*#
NASA-CR-128144 ..... N72-32348*#
NASA-CR-128145 ..... N72-32349*#
NASA-CR-128146 ..... N72-32350*#
NASA-CR-128147 ..... N72-32351*#
NASA-CR-128148 ..... N72-32352*#
NASA-CR-128149 ..... N72-32353*#
NASA-CR-128150 ..... N72-32354*#
NASA-CR-128151 ..... N72-32355*#
NASA-CR-128152 ..... N72-32356*#
NASA-CR-128153 ..... N72-32357*#
NASA-CR-128154 ..... N72-32489*#
NASA-CR-128155 ..... N72-32358*#
NASA-CR-128156 ..... N72-32359*#
NASA-CR-128157 ..... N72-32360*#
NASA-CR-128158 ..... N72-32362*#
NASA-CR-128159 ..... N72-32361*#
NASA-CR-128160 ..... N72-32363*#
NASA-CR-128162 ..... N72-32364*#
NASA-CR-128163 ..... N72-32365*#
NASA-CR-128164 ..... N72-32366*#
NASA-CR-128165 ..... N72-32367*#
NASA-CR-128167 ..... N72-32368*#
NASA-CR-128168 ..... N72-32369*#
NASA-CR-128169 ..... N72-32370*#
NASA-CR-128170 ..... N72-32371*#
NASA-CR-128171 ..... N72-32491*#
NASA-CR-128172 ..... N72-31993*#
NASA-CR-128173 ..... N72-32257*#
NASA-CR-128174 ..... N72-32775*#
NASA-CR-128175 ..... N72-32454*#
NASA-CR-128176 ..... N72-32372*#
NASA-CR-128177 ..... N72-32373*#
NASA-CR-128178 ..... N72-32453*#
NASA-CR-128179 ..... N72-32203*#
NASA-CR-128180 ..... N72-32374*#
NASA-CR-128181 ..... N72-32375*#
NASA-CR-128182 ..... N72-32376*#
NASA-CR-128183 ..... N72-32377*#
NASA-CR-128184 ..... N72-32378*#
NASA-CR-128185 ..... N72-32379*#
NASA-CR-128186 ..... N72-32380*#
NASA-CR-128187 ..... N72-32381*#
NASA-CR-128188 ..... N72-32382*#
NASA-CR-128189 ..... N72-32383*#
NASA-CR-128190 ..... N72-32384*#
NASA-CR-128191 ..... N72-32385*#
NASA-CR-128192 ..... N72-32386*#
NASA-CR-128193 ..... N72-32262*#
NASA-CR-128194 ..... N72-32806*#
NASA-CR-128195 ..... N72-32585*#
NASA-CR-128196 ..... N72-32070*#
NASA-CR-128197 ..... N72-32016*#
NASA-CR-128198 ..... N72-32460*#
NASA-CR-128199 ..... N72-32174*#
NASA-CR-128201 ..... N72-32803*#
NASA-CR-128202 ..... N72-32802*#
NASA-CR-128203 ..... N72-32795*#
NASA-CR-128209 ..... N72-32387*#
NASA-CR-128210 ..... N72-32388*#
NASA-CR-128211 ..... N72-32389*#
NASA-CR-128213 ..... N72-32083*#
NASA-CR-128216 ..... N72-32910*#
NASA-CR-128249 ..... N72-32081*#
NASA-CR-128250 ..... N72-32455*#
NASA-CR-128282 ..... N72-32776*#
NASA-CR-128294 ..... N72-32957*#
NASA-CR-128295 ..... N72-32777*#
NASA-CR-128296 ..... N72-32082*#
NASA-CR-128297 ..... N72-32689*#
NASA-CR-128298 ..... N72-32639*#
NASA-CR-128299 ..... N72-32232*#
NASA-CR-128300 ..... N72-32743*#
NASA-CR-128302 ..... N72-32117*#
NASA-CR-128414 ..... N72-32767*#
NASA-CR-128415 ..... N72-32718*#
NASA-CR-128416 ..... N72-32472*#
NASA-CR-128417 ..... N72-32766*#
NASA-CR-128534 ..... N72-32805*#
NASA-CR-128535 ..... N72-32833*#
NASA-CR-128536 ..... N72-32138*#
NASA-CR-128544 ..... N72-32641*#
NASA-CR-128553 ..... N72-32211*#
NASA-CR-130054 ..... N72-32177*#
NASA-CR-130055 ..... N72-32178*#
NASA-CR-130056 ..... N72-32181*#
NASA-CR-130057 ..... N72-32180*#
NASA-CR-130058 ..... N72-32813*#
NASA-CR-130059 ..... N72-32391*#
NASA-CR-130062 ..... N72-32228*#
NASA-CR-130063 ..... N72-32230*#
NASA-CR-130064 ..... N72-32786*#

NASA-SP-7011(104) ..... N72-32080*+

NASA-TM-X-2580 ..... N72-32949*#
NASA-TM-X-2589 ..... N72-32650*#
NASA-TM-X-2602 ..... N72-32318*#
NASA-TM-X-2629 ..... N72-32765*#
NASA-TM-X-2637 ..... N72-32867*#
NASA-TM-X-2647 ..... N72-32317*#
NASA-TM-X-2657 ..... N72-32950*#
NASA-TM-X-2660 ..... N72-32212*#
NASA-TM-X-62180 ..... N72-32742*#
NASA-TM-X-62185 ..... N72-32570*#
NASA-TM-X-64672 ..... N72-32222*#
NASA-TM-X-64691 ..... N72-32473*#
NASA-TM-X-64695 ..... N72-32231*#
NASA-TM-X-66012 ..... N72-32851*#
NASA-TM-X-66013 ..... N72-32400*#
NASA-TM-X-66014 ..... N72-32692*#
NASA-TM-X-66015 ..... N72-32781*#
NASA-TM-X-66016 ..... N72-32401*#
NASA-TM-X-66017 ..... N72-32812*#
NASA-TM-X-66018 ..... N72-32263*#
NASA-TM-X-66019 ..... N72-32782*#
NASA-TM-X-66020 ..... N72-32258*#
NASA-TM-X-66023 ..... N72-32850*#
NASA-TM-X-66024 ..... N72-32395*#
NASA-TM-X-66025 ..... N72-32811*#
NASA-TM-X-66026 ..... N72-32810*#
NASA-TM-X-66028 ..... N72-32397*#
NASA-TM-X-66029 ..... N72-32778*#
NASA-TM-X-66030 ..... N72-32226*#
NASA-TM-X-66031 ..... N72-32779*#
NASA-TM-X-66032 ..... N72-32173*#
NASA-TM-X-66033 ..... N72-32207*#
NASA-TM-X-66035 ..... N72-32783*#
NASA-TM-X-66036 ..... N72-32654*#
NASA-TM-X-66037 ..... N72-32463*#
NASA-TM-X-66039 ..... N72-32402*#
NASA-TM-X-66040 ..... N72-32515*#
NASA-TM-X-66041 ..... N72-32464*#
NASA-TM-X-66044 ..... N72-32417*#
NASA-TM-X-66046 ..... N72-32185*#
NASA-TM-X-66047 ..... N72-32184*#
NASA-TM-X-66051 ..... N72-32683*#
NASA-TM-X-66052 ..... N72-32419*#
NASA-TM-X-66053 ..... N72-32418*#
NASA-TM-X-66054 ..... N72-32682*#
NASA-TM-X-66055 ..... N72-32840*#
NASA-TM-X-66056 ..... N72-32839*#
NASA-TM-X-67959 ..... N72-32759*#
NASA-TM-X-68056 ..... N72-32541*#
NASA-TM-X-68062 ..... N72-32205*#
NASA-TM-X-68113 ..... N72-32459*#
NASA-TM-X-68119 ..... N72-32542*#
NASA-TM-X-68123 ..... N72-32458*#
NASA-TM-X-68124 ..... N72-32715*#
NASA-TM-X-68126 ..... N72-32716*#
NASA-TM-X-68127 ..... N72-32652*#
NASA-TM-X-68128 ..... N72-32316*#
NASA-TM-X-68129 ..... N72-32754*#
NASA-TM-X-68130 ..... N72-32762*#
NASA-TM-X-68131 ..... N72-32043*#
NASA-TM-X-68134 ..... N72-32678*#
NASA-TM-X-68135 ..... N72-32182*#
NASA-TM-X-68144 ..... N72-32763*#
NASA-TM-X-68613 ..... N72-32808*#
NASA-TM-X-68615 ..... N72-32605*#
NASA-TM-X-68626 ..... N72-32818*#
NASA-TM-X-68634 ..... N72-32827*#

NASA-TN-D-6786 ..... N72-32462*#
NASA-TN-D-6820 ..... N72-32853*#
NASA-TN-D-6822 ..... N72-32608*#
NASA-TN-D-6830 ..... N72-32300*#
NASA-TN-D-6876 ..... N72-32856*#
NASA-TN-D-6884 ..... N72-32679*#
NASA-TN-D-6909 ..... N72-32044*#
NASA-TN-D-6910 ..... N72-32855*#
NASA-TN-D-6911 ..... N72-32673*#
NASA-TN-D-6929 ..... N72-32911*#
NASA-TN-D-6932 ..... N72-32045*#
NASA-TN-D-6937 ..... N72-32547*#
NASA-TN-D-6949 ..... N72-32834*#
NASA-TN-D-6966 ..... N72-32939*#
NASA-TN-D-6967 ..... N72-32072*#
NASA-TN-D-6972 ..... N72-32852*#
NASA-TN-D-6977 ..... N72-32848*#
NASA-TN-D-6979 ..... N72-32857*#

NASA-TN-D-6983 ..... N72-32571*#
NASA-TN-D-6984 ..... N72-32764*#
NASA-TN-D-6985 ..... N72-32695*#
NASA-TN-D-6988 ..... N72-32549*#
NASA-TN-D-6991 ..... N72-32474*#
NASA-TN-D-7053 ..... N72-32155*#

NASA-TR-R-390 ..... N72-32590*#

NASA-TT-F-13919 ..... N72-32817*#
NASA-TT-F-14285 ..... N72-32010*#
NASA-TT-F-14316 ..... N72-32264*#
NASA-TT-F-14323 ..... N72-32398*#
NASA-TT-F-14342 ..... N72-32085*#
NASA-TT-F-14349 ..... N72-32116*#
NASA-TT-F-14367 ..... N72-32693*#
NASA-TT-F-14371 ..... N72-32586*#
NASA-TT-F-14414 ..... N72-32412*#
NASA-TT-F-14415 ..... N72-32410*#
NASA-TT-F-14416 ..... N72-32470*#
NASA-TT-F-14417 ..... N72-32411*#
NASA-TT-F-14418 ..... N72-32471*#
NASA-TT-F-14419 ..... N72-32836*#
NASA-TT-F-14420 ..... N72-32588*#
NASA-TT-F-14422 ..... N72-32409*#
NASA-TT-F-14426 ..... N72-32681*#
NASA-TT-F-14427 ..... N72-32835*#
NASA-TT-F-14430 ..... N72-32680*#
NASA-TT-F-14431 ..... N72-32112*#
NASA-TT-F-14432 ..... N72-32591*#
NASA-TT-F-14433 ..... N72-32213*#
NASA-TT-F-14434 ..... N72-32416*#
NASA-TT-F-14437 ..... N72-32830*#
NASA-TT-F-14438 ..... N72-32315*#
NASA-TT-F-14440 ..... N72-32111*#
NASA-TT-F-14441 ..... N72-32469*#
NASA-TT-F-14442 ..... N72-32787*#
NASA-TT-F-14443 ..... N72-32947*#
NASA-TT-F-14444 ..... N72-32832*#
NASA-TT-F-14445 ..... N72-32828*#
NASA-TT-F-14448 ..... N72-32157*#
NASA-TT-F-14449 ..... N72-32073*#
NASA-TT-F-14450 ..... N72-32676*#
NASA-TT-F-14451 ..... N72-32677*#
NASA-TT-F-14452 ..... N72-32838*#
NASA-TT-F-14453 ..... N72-32829*#
NASA-TT-F-14454 ..... N72-32831*#
NASA-TT-F-14455 ..... N72-32109*#
NASA-TT-F-14456 ..... N72-32823*#
NASA-TT-F-14457 ..... N72-32118*#
NASA-TT-F-14458 ..... N72-32475*#
NASA-TT-F-14459 ..... N72-32717*#
NASA-TT-F-14460 ..... N72-32822*#
NASA-TT-F-14461 ..... N72-32406*#
NASA-TT-F-14462 ..... N72-32012*#
NASA-TT-F-14463 ..... N72-32314*#
NASA-TT-F-14464 ..... N72-32946*#
NASA-TT-F-14465 ..... N72-32518*#
NASA-TT-F-14466 ..... N72-32658*#
NASA-TT-F-14467 ..... N72-32413*#
NASA-TT-F-14468 ..... N72-32042*#
NASA-TT-F-14469 ..... N72-32405*#
NASA-TT-F-14470 ..... N72-32821*#
NASA-TT-F-14471 ..... N72-32408*#
NASA-TT-F-14472 ..... N72-32825*#
NASA-TT-F-14473 ..... N72-32785*#
NASA-TT-F-14474 ..... N72-32820*#
NASA-TT-F-14475 ..... N72-32824*#
NASA-TT-F-14476 ..... N72-32520*#
NASA-TT-F-14477 ..... N72-32550*#
NASA-TT-F-14478 ..... N72-32519*#
NASA-TT-F-14479 ..... N72-32407*#
NASA-TT-F-14480 ..... N72-32592*#
NASA-TT-F-14481 ..... N72-32156*#
NASA-TT-F-14482 ..... N72-32110*#
NASA-TT-F-14483 ..... N72-32151*#
NASA-TT-F-14484 ..... N72-32209*#
NASA-TT-F-14485 ..... N72-32826*#
NASA-TT-F-14486 ..... N72-32153*#
NASA-TT-F-14487 ..... N72-32152*#
NASA-TT-F-14489 ..... N72-32047*#
NASA-TT-F-14490 ..... N72-32819*#
NASA-TT-F-14491 ..... N72-32837*#
NASA-TT-F-14503 ..... N72-32154*#
NASA-TT-F-14505 ..... N72-32074*#
NASA-TT-F-14507 ..... N72-32809*#
NASA-TT-F-14509 ..... N72-32934*#
NASA-TT-F-14511 ..... N72-32393*#
NASA-TT-F-14513 ..... N72-32394*#

NASA-TT-F-14517 ..... N72-32978*#
NASA-TT-F-14525 ..... N72-32935*#
NASA-TT-F-14528 ..... N72-32943*#
NASA-TT-F-14529 ..... N72-32936*#
NASA-TT-F-14535 ..... N72-32139*#
NASA-TT-F-14537 ..... N72-32301*#
NASA-TT-F-14540 ..... N72-32904*#
NASA-TT-F-14542 ..... N72-32094*#
NASA-TT-F-14543 ..... N72-32086*#
NASA-TT-F-14544 ..... N72-32087*#
NASA-TT-F-14545 ..... N72-32095*#
NASA-TT-F-14546 ..... N72-32399*#
NASA-TT-F-14547 ..... N72-32302*#
NASA-TT-F-14548 ..... N72-32303*#
NASA-TT-F-14549 ..... N72-32096*#
NASA-TT-F-14550 ..... N72-32097*#
NASA-TT-F-14552 ..... N72-32604*#
NASA-TT-F-14553 ..... N72-32092*#
NASA-TT-F-14554 ..... N72-32493*#
NASA-TT-F-14555 ..... N72-32940*#
NASA-TT-F-14556 ..... N72-32497*#
NASA-TT-F-14559 ..... N72-32148*#
NASA-TT-F-14561 ..... N72-32098*#
NASA-TT-F-14564 ..... N72-32099*#
NASA-TT-F-14565 ..... N72-32100*#
NASA-TT-F-14566 ..... N72-32101*#
NASA-TT-F-14567 ..... N72-32088*#
NASA-TT-F-14568 ..... N72-32089*#
NASA-TT-F-14569 ..... N72-32090*#
NASA-TT-F-14570 ..... N72-32091*#
NASA-TT-F-14571 ..... N72-32102*#
NASA-TT-F-14572 ..... N72-32948*#
NASA-TT-F-14574 ..... N72-32103*#
NASA-TT-F-14575 ..... N72-32312*#
NASA-TT-F-14576 ..... N72-32905*#
NASA-TT-F-14577 ..... N72-32104*#
NASA-TT-F-14578 ..... N72-32313*#
NASA-TT-F-14579 ..... N72-32105*#
NASA-TT-F-14588 ..... N72-32114*#
NASA-TT-F-14589 ..... N72-32414*#
NASA-TT-F-14591 ..... N72-32106*#
NASA-TT-F-14592 ..... N72-32075*#
NASA-TT-F-14594 ..... N72-32660*#
NASA-TT-F-14599 ..... N72-32696*#
NASA-TT-F-14601 ..... N72-32304*#
NASA-TT-F-14604 ..... N72-32854*#
NASA-TT-F-14606 ..... N72-32979*#
NASA-TT-F-14608 ..... N72-32113*#

NAVSECPHILADIV-A-1000 ..... N72-32323 #

NAVTRADEVCEN-TN-29 ..... N72-32243 #

NBS-SP-330 ..... N72-32968 #
NBS-SP-330-1972 ..... N72-32968 #
NBS-SP-360 ..... N72-32569 #

NBS-TN-726 ..... N72-32225 #

NBS-10593 ..... N72-32648 #

NCEL-TR-763-PT-1-PT-2 ..... N72-32916 #

NELC-IR-723 ..... N72-32197 #

NLL-RTS-6739 ..... N72-32451
NLL-RTS-6743 ..... N72-32256
NLL-RTS-7056 ..... N72-32597
NLL-RTS-7057 ..... N72-32598
NLL-RTS-7058 ..... N72-32599
NLL-RTS-7059 ..... N72-32600
NLL-RTS-7060 ..... N72-32601
NLL-RTS-7061 ..... N72-32602
NLL-RTS-7250 ..... N72-32287
NLL-RTS-7269 ..... N72-32538
NLL-RTS-7353 ..... N72-32449
NLL-RTS-7354 ..... N72-32450
NLL-RTS-7374 ..... N72-32488
NLL-RTS-7421 ..... N72-32932

NMAB-288 ..... N72-32920 #
NMAB-293 ..... N72-32548 #

NOAA-TM-NESS-42 ..... N72-32607 #

NOAA-TR-NESS-60 ..... N72-32780 #

NOLTR-71-165 ..... N72-32577 #
NOLTR-72-8 ..... N72-32286 #

NOR-71-207 ..... N72-32282 #

NORSAR-23 ..... N72-32447 #

NOS-IHTR-354 ..... N72-32744 #

NP-19250 ..... N72-32685 #
NP-19262 ..... N72-32702 #
NP-19269 ..... N72-32699 #
NP-19291 ..... N72-32701 #

NRC-TT-1572 ..... N72-32909 #

NRC-12765 ..... N72-32310 #

NSF-72-316 ..... N72-32962 #

NSRDC-3794 ..... N72-32324 #
NSRDC-3797 ..... N72-32331 #

NTID300.12 ..... N72-32913 #

NTSB-AAS-72-6 ..... N72-32046 #

NUSC-TR-4235 ..... N72-32198 #

NWL-TR-2732 ..... N72-32729 #

NYO-3077-185 ..... N72-32707 #

ONERA-NT-169 ..... N72-32749 #

ONRL-R-5-72 ..... N72-32269 #

ORNL-TM-3783 ..... N72-32651 #
ORNL-TM-3788 ..... N72-32687 #

ORO-4044-2 ..... N72-32556 #

P-4860 ..... N72-32976 #
P-4862 ..... N72-32589 #
P-4865 ..... N72-32210 #

PAPER-71-117 ..... N72-32048 #

PB-204576-D ..... N72-32274 #
PB-204576-F ..... N72-32274 #
PB-204959-D ..... N72-32273 #
PB-204959-F ..... N72-32273 #
PB-205578-D ..... N72-32272 #
PB-205578-F ..... N72-32272 #
PB-206167-D ..... N72-32271 #
PB-206167-F ..... N72-32271 #
PB-206262-D ..... N72-32277 #
PB-206262-F ..... N72-32277 #
PB-206552-D ..... N72-32276 #
PB-206552-F ..... N72-32276 #
PB-207064-D ..... N72-32270 #
PB-207064-F ..... N72-32270 #
PB-207235-D ..... N72-32275 #
PB-207235-F ..... N72-32275 #
PB-208108 ..... N72-32858 #
PB-208567 ..... N72-32430 #
PB-208568 ..... N72-32431 #

PIBAL-71-B ..... N72-32713 #

PII-3038-8 ..... N72-32168 #

PR-1 ..... N72-32337*#
PR-2 ..... N72-32341*#
PR-67 ..... N72-32209*#
PR-98 ..... N72-32586*#
PR-101 ..... N72-32414*#
PR-111 ..... N72-32696*#

PRC-D-2085 ..... N72-32843*#

PREPRINT-19 ..... N72-32701 #

PRRL-72-CR-12 ..... N72-32535 #
PRRL-72-CR-20 ..... N72-32719*#

PSL-PR00759 ..... N72-32251 #

PSRP-480 ..... N72-32191 #

PSU-IRL-SCI-390 ..... N72-32391*#

PUBL-142 ..... N72-32609 #

PWA-FR-5129 ..... N72-32145*#

QPR-2 ..... N72-32718*#
QPR-3 ..... N72-32535 #

QR-1 ..... N72-32237 #
QR-1 ..... N72-32953 #
QR-3 ..... N72-32165 #

R-71-016-4 ..... N72-32526 #
R-101 ..... N72-32242 #
R-693-SECT-4-REV-1 ..... N72-32641*#
R-8950 ..... N72-32745 #

RAC-MDED-0472 ..... N72-32239 #

RAC-TP-450 ..... N72-32284 #

RADC-TR-71-305 ..... N72-32201 #
RADC-TR-72-2-VOL-1 ..... N72-32215 #
RADC-TR-72-68 ..... N72-32481 #
RADC-TR-72-100 ..... N72-32195 #
RADC-TR-72-104 ..... N72-32248 #
RADC-TR-72-109 ..... N72-32249 #
RADC-TR-72-113 ..... N72-32069 #
RADC-TR-72-119 ..... N72-32535 #
RADC-TR-72-120 ..... N72-32486 #

RAE-LIB-TRANS-1586 ..... N72-32092 #
RAE-LIB-TRANS-1593-(A)-PT-1 ..... N72-32186 #
RAE-LIB-TRANS-1593-(B)-PT-2 ..... N72-32187 #
RAE-LIB-TRANS-1595 ..... N72-32461 #
RAE-LIB-TRANS-1630 ..... N72-32965 #
RAE-LIB-TRANS-1644-PT-2 ..... N72-32496 #
RAE-LIB-TRANS-1645-PT-2 ..... N72-32224 #
RAE-LIB-TRANS-1650 ..... N72-32755 #
RAE-LIB-TRANS-1652 ..... N72-32308 #
RAE-LIB-TRANS-1653 ..... N72-32299 #
RAE-LIB-TRANS-1654 ..... N72-32307 #
RAE-LIB-TRANS-1655 ..... N72-32298 #
RAE-LIB-TRANS-1658 ..... N72-32136 #
RAE-LIB-TRANS-1661 ..... N72-32108 #
RAE-LIB-TRANS-1664 ..... N72-32223 #
RAE-LIB-TRANS-1667 ..... N72-32150 #
RAE-LIB-TRANS-1668 ..... N72-32093 #

RDA-TR-061-WHO ..... N72-32634 #

RE-440 ..... N72-32655 #

REPT-1 ..... N72-32134 #
REPT-3 ..... N72-32127 #
REPT-4 ..... N72-32448
REPT-4WWTP-72-2 ..... N72-32638 #
REPT-5WWTN-72-2 ..... N72-32637 #
REPT-13-72 ..... N72-32585*#
REPT-72-26 ..... N72-32774 #
REPT-2580-F ..... N72-32201 #
REPT-6223-R ..... N72-32954*#
REPT-6655 ..... N72-32220 #
REPT-9500-920249 ..... N72-32260 #
REPT-005020-VOL-1 ..... N72-32564 #
REPT-005020-VOL-2 ..... N72-32565 #
REPT-036740-F ..... N72-32190 #
REPT-080410-1-F ..... N72-32813*#

RI-7676 ..... N72-32227 #

RIFP-154 ..... N72-32657 #

RPP/A-88 ..... N72-32661 #

RRA-T7206 ..... N72-32833*#

SACLANTCEN-TR-203 ..... N72-32662 #

SAM-TR-71-43 ..... N72-32052 #
SAM-TR-71-45 ..... N72-32670 #

SAM-TT-R-1116-0472 ..... N72-32128 #

SAMSO-TR-72-68-BK-1 ..... N72-32918 #
SAMSO-TR-72-81 ..... N72-32531 #
SAMSO-TR-72-109 ..... N72-32480 #
SAMSO-TR-72-117-VOL-1 ..... N72-32216 #
SAMSO-TR-72-117-VOL-2 ..... N72-32217 #
SAMSO-TR-72-121 ..... N72-32859 #
SAMSO-TR-72-129 ..... N72-32162 #

SAPR-1 ..... N72-32253 #

SAR-2 ..... N72-32612 #
SAR-7 ..... N72-32613 #

SASR-22 ..... N72-32082*#

SATR-1 ..... N72-32633 #

SC-DC-721230 ..... N72-32524 #

SCL-DR-710351 ..... N72-32319 #

SCL-RR-720007 ..... N72-32049 #
SCL-RR-720227 ..... N72-32558 #

SD-72-SA-0007 ..... N72-32801*#
SD-72-SA-0007-APP-B ..... N72-32802*#
SD-72-SA-0007-APP-C ..... N72-32803*#
SD-72-SA-0007-VOL-1 ..... N72-32795*#
SD-72-SA-0007-VOL-2-PT-1 ..... N72-32796*#
SD-72-SA-0007-VOL-2-PT-2 ..... N72-32797*#
SD-72-SA-0007-VOL-2-PT-4 ..... N72-32799*#
SD-72-SA-0007-VOL-3 ..... N72-32800*#
SD-72-SA-0007-VOL-3-PT-3 ..... N72-32798*#
SD-72-SA-0008 ..... N72-32804*#

SIO-REF-72-1 ..... N72-32436 #

SOLID-STATE-DEVICE-TR-10 ..... N72-32727 #

SQUID-TR-BRN-22-PU ..... N72-32328 #

SR-1 ..... N72-32440 #
SR-2-VOL-1 ..... N72-32424 #
SR-8 ..... N72-32724 #
SR-56 ..... N72-32199 #
SR-57 ..... N72-32261 #
SR-72-3 ..... N72-32196 #
SR-72-1080 ..... N72-32138*#
SR-390 ..... N72-32391*#

SRD-72-058 ..... N72-32562 #

SRDE-71023 ..... N72-32721 #

SRL-71-3 ..... N72-32777*#

SSL-SER-13-ISSUE-8 ..... N72-32455*#

STU-70-394/U-325 ..... N72-32158 #

SU-SUDAAR-440 ..... N72-32257*#

TA-3919 ..... N72-32722 #

TAE-147 ..... N72-32910*#

TB-79 ..... N72-32908 #

TD-522-72 ..... N72-32218 #

TID-25979 ..... N72-32610 #

TN-1972-2 ..... N72-32189 #
TN-6050.23-ADD ..... N72-32643 #

TOP-7-3-070 ..... N72-32278 #

TP-697 ..... N72-32047*#

TR-RSC-37 ..... N72-32472*#

TR-1 ..... N72-32538 #
TR-2 ..... N72-32930 #
TR-4 ..... N72-32330 #
TR-4 ..... N72-32917 #
TR-6 ..... N72-32576 #
TR-6 ..... N72-32741 #
TR-9 ..... N72-32914 #
TR-10 ..... N72-32236 #
TR-23 ..... N72-32254 #
TR-25 ..... N72-32926 #
TR-64 ..... N72-32508 #
TR-72-1 ..... N72-32972 #
TR-72-022 ..... N72-32674 #

TR-72-065 ..... N72-32671 #
TR-72-080 ..... N72-32776*#
TR-73-023 ..... N72-32675 #
TR-072(S2816-15)-2 ..... N72-32859 #
TR-126 ..... N72-32204 #
TR-152 ..... N72-32194 #
TR-598-8 ..... N72-32537 #
TR-0172(2250-30)-3 ..... N72-32480 #
TR-0172(2250-40)-7 ..... N72-32162 #
TR-0172(2779)-1 ..... N72-32531 #
TR-1022 ..... N72-32082*#
TR-7205.582 ..... N72-32456 #
TR-7205.584 ..... N72-32494 #
TR-7205.585 ..... N72-32543 #
TR-7206.586 ..... N72-32546 #
TR-7206.587 ..... N72-32545 #
TR-7206.588 ..... N72-32544 #

TRITA-EPP-71-14 ..... N72-32420 #
TRITA-EPP-71-20 ..... N72-32697 #

UCLA-ENG-7234 ..... N72-32568 #

UCRL-51208 ..... N72-32706 #
UCRL-73654 ..... N72-32478 #
UCRL-73846 ..... N72-32159 #

UDRI-TR-71-48 ..... N72-32280 #
UDRI-TR-72-21-VOL-2 ..... N72-32756 #
UDRI-TR-72-22 ..... N72-32279 #

UILU-ENG-72-2529 ..... N72-32144 #

US-PATENT-APPL-SN-100639 ..... N72-32452*
US-PATENT-APPL-SN-103077 ..... N72-32688*
US-PATENT-APPL-SN-112988 ..... N72-32169*
US-PATENT-APPL-SN-119282 ..... N72-32498*#
US-PATENT-APPL-SN-138229 ..... N72-32487*
US-PATENT-APPL-SN-288856 ..... N72-32229*#
US-PATENT-APPL-SN-289033 ..... N72-32500*#
US-PATENT-APPL-SN-289050 ..... N72-32501*#
US-PATENT-APPL-SN-292686 ..... N72-32760*#

US-PATENT-CLASS-118-49.1 ..... N72-32487*
US-PATENT-CLASS-204-298 ..... N72-32487*
US-PATENT-CLASS-219-121P N72-32487*
US-PATENT-CLASS-219-273 ..... N72-32487*
US-PATENT-CLASS-313-231 ..... N72-32688*
US-PATENT-CLASS-315-111 ..... N72-32688*
US-PATENT-CLASS-343-781 ..... N72-32169*
US-PATENT-CLASS-343-837 ..... N72-32169*
US-PATENT-CLASS-343-840 ..... N72-32169*
US-PATENT-CLASS-343-915 ..... N72-32169*
US-PATENT-CLASS-350-79 ..... N72-32452*
US-PATENT-CLASS-356-241 ..... N72-32452*

US-PATENT-3,680,144 ..... N72-32169*
US-PATENT-3,690,291 ..... N72-32487*
US-PATENT-3,693,002 ..... N72-32688*
US-PATENT-3,694,094 ..... N72-32452*

USAAMRDL-TR-71-18B ..... N72-32053 #
USAAMRDL-TR-71-18C ..... N72-32054 #
USAAMRDL-TR-71-70 ..... N72-32921 #
USAAMRDL-TR-72-14 ..... N72-32507 #
USAAMRDL-TR-72-17 ..... N72-32580 #

USAARL-71-22 ..... N72-32119 #
USAARL-71-23 ..... N72-32120 #
USAARL-72-11 ..... N72-32476 #
USAARL-72-13 ..... N72-32061 #
USAARL-72-14 ..... N72-32649 #
USAARL-72-15 ..... N72-32579 #

UTC-2380-FR ..... N72-32575 #

VPI-72-6 ..... N72-32915 #

WAPD-TM-1014 ..... N72-32421 #

WASH-1199 ..... N72-32952 #

WHOI-REF-71-63-VOL-1 ..... N72-32430 #
WHOI-REF-71-63-VOL-2 ..... N72-32431 #

X-524-72-343 ..... N72-32515*#
X-550-72-268 ..... N72-32401*#
X-551-72-277 ..... N72-32812*#
X-552-71-58 ..... N72-32207*#
X-553-72-50 ..... N72-32851*#
X-553-72-273 ..... N72-32397*#
X-553-72-290 ..... N72-32263*#
X-553-72-341 ..... N72-32402*#
X-625-72-219 ..... N72-32400*#
X-625-72-220 ..... N72-32692*#
X-625-72-276 ..... N72-32778*#
X-625-72-338 ..... N72-32395*#
X-641-72-339 ..... N72-32811*#
X-641-72-361 ..... N72-32682*#
X-645-72-293 ..... N72-32783*#
X-645-72-355 ..... N72-32419*#
X-646-72-348 ..... N72-32683*#
X-651-72-279 ..... N72-32417*#
X-651-72-358 ..... N72-32418*#
X-661-72-316 ..... N72-32463*#
X-672-72-366 ..... N72-32839*#
X-673-72-362 ..... N72-32840*#
X-690-72-337 ..... N72-32850*#
X-690-72-347 ..... N72-32810*#
X-690-72-353 ..... N72-32464*#
X-692-72-300 ..... N72-32654*#
X-692-72-309 ..... N72-32782*#
X-693-72-254 ..... N72-32781*#
X-693-72-342 ..... N72-32779*#
X-711-72-302 ..... N72-32226*#
X-730-72-323 ..... N72-32185*#
X-734-72-344 ..... N72-32173*#
X-752-72-324 ..... N72-32184*#
X-765-72-315 ..... N72-32258*#

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA deposits its technical documents and bibliographic tools in eleven special regional libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
OKLAHOMA
Oklahoma County Libraries, Oklahoma City
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York, 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the National Lending Library for Science and Technology, Boston Spa, Yorkshire, England. By virtue of arrangements other than with NASA, the National Lending Library also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESRO/ELDO Space Documentation Service, European Space Research Organization, 114, av. Charles de Gaulle, 92-Neuilly-sur-Seine, France.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

FIRST CLASS MAIL

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
451

POSTMASTER: If Undeliverable (Section 1
Postal Manual) Do Not Re

NEW NASA PUBLICATIONS

Animal Orientation and Navigation (NASA SP–262)

The proceedings of a symposium sponsored by NASA, the Smithsonian Institution, and the American Institute of Biological Sciences and held at Wallops Station, Va., in September 1970. Purpose of the symposium was to report on the beginnings made in using satellites and applying recent bioengineering developments as a means of gaining information about the many questions of bird and animal travel, particularly the mechanisms involved in long-distance navigational ability. *Paperbound.* 620 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $5.75.

Summary of Transformation Equations and Equations of Motion Used in Free-Flight and Wind-Tunnel Data Reduction and Analysis (NASA SP–3070)

By THOMAS G. GAINER AND SHERWOOD HOFFMAN

This is a handbook of basic equations from which the engineer can generate many of the equations needed for a particular analysis. In addition to the basic equations, the expanded, most general form of each is given in most cases. From the expanded forms, the simpler forms can be written out fairly easily. Gainer and Hoffman are at Langley Research Center. *Paperbound.* 136 pp. For sale by the National Technical Information Service, Springfield, Va. 22151, for $3.00.

Scientific and Technical Information Office
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C. 20546